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Cooperative
ECONOMIC INSECT
REPORT

INSECTS NOT KNOWN
To Occur In The United States

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DEPARTMENT OF AGRICULTURE

Issued by

PLANT PEST CONTROL DIVISION

AGRICULTURAL RESEARCH SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE

PLANT PEST CONTROL DIVISION

SURVEY AND DETECTION OPERATIONS

The Cooperative Economic Insect Report is issued weekly as a service to American Agriculture. Its contents are compiled from information supplied by cooperating State, Federal, and industrial entomologists and other agricultural workers. In releasing this material the Division serves as a clearinghouse and does not assume responsibility for accuracy of the material.

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Survey and Detection Operations
Plant Pest Control Division
Agricultural Research Service
United States Department of Agriculture
Washington 25, D. C.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

(37-72 of Series)

This series was initiated early in 1957 as an aid in strengthening the detection program against foreign insect pests not known to be established in this country. The statements have been released individually in the Cooperative Economic Insect Report, but due to requests for complete sets of the series, the separates have been assembled under one cover at the close of each year. This is the second such compilation. The series will continue to appear periodically in the Report. Preparation of this material has been made possible through the generous cooperation of Plant Quarantine and Entomology Research Division, ARS, and the U. S. National Museum.

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INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

SILVER-Y MOTH* (Autographa gamma (L.))

Economic Importance: Outbreaks of this noctuid occur periodically over wide areas of Europe, Asia and North Africa. Infestations were unusually heavy in flax and truck crops throughout European USSR in 1922. The outbreak of 1928, which occurred in most of central Europe, caused widespread defoliation of peas in Poland. Damage from this insect and Pieris rapae in areas of the Netherlands ran as much as 320,000 guilders during some years in the 1800's. It is also very destructive in England and Denmark. Outbreaks are more frequent in North Africa and southern USSR than in central Europe. Between years of high populations, the pest is generally not conspicuous.

Distribution: Widely distributed throughout all of Europe, and eastward through Asia to India and China; also occurs in North Africa.



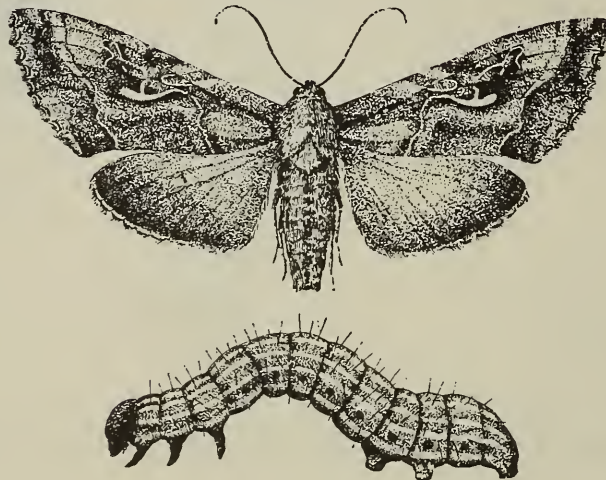
General Distribution of Silver-Y Moth

*Also called gamma noctuid. (Noctuidae, Lepidoptera)

Hosts: Attacks many plants. The most important cultivated hosts are potatoes, beets, flax, hemp, crucifers and legumes. Cereals, grasses and even forest trees, are sometimes attacked.

Life History and Habits: The adults appear during June. Females oviposit about 500 whitish eggs, singly or in small batches, on the underside of leaves of low-growing plants. The incubation period lasts for 10-12 days. The young caterpillars web and feed on vegetation of the host plants. At times the larvae may destroy entire crops during outbreaks, then collect in great numbers on the soil and migrate in bands to other fields, devouring susceptible foliage in their path. The larvae readily drop from plants when disturbed. Larval development requires less than a month. By July, most of the feeding is completed and toward the end of the month pupation occurs. Pupation takes place in a cocoon on host plants and lasts from 12 to 15 days. Second-brood adults are in flight from mid-August to mid-September. Second-brood larvae develop to late instars or into pupae before hibernation. There are normally two generations a year.

Description: Adult forewings are marbled in appearance, ground color is silvery-gray to reddish-gray with a velvety sheen. The Y mark is distinct and silvery; hindwings brownish with a darker border. Wing expanse is 36 to 40 mm. Larva is of varying shades of green, with a dark green dorsal line and a paler line of whitish-green on each side. Spiracular line yellowish edged above with green. Some larval forms have a number of white spots. Head with black markings. The larva of this species cannot be separated from larvae of several other species of the group that occur in the United States without a technical description. The cocoon is dirty-white. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.)
CEIR 8 (23) 6-6-58



Adult and Larva of Autographa gamma

Figures (except map) from Jablonowski, J. 1906. Animals Injurious to Sugar Beet. 288 pp. Budapest. (In Czech.).

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

A LEAF-FEEDING COCCINELLID (Epilachna paenulata (Germar))

Economic Importance: This species of Epilachna is generally considered to be the most destructive of the genus in South America. Infestations have been reported as destroying entire plantings of squash and kidney beans in Argentina and Uruguay. Though of particular importance on cucurbits in areas where it occurs, it is considered a general feeder. The adults have been intercepted several times at U. S. ports of entry with banana debris from Ecuador and with grapes and airplane baggage from Argentina.

Distribution: Occurs throughout the central part of Argentina and in Bolivia, Brazil, Uruguay and probably Ecuador.

Hosts: Feeds on many hosts; most important on cucurbits and beans.

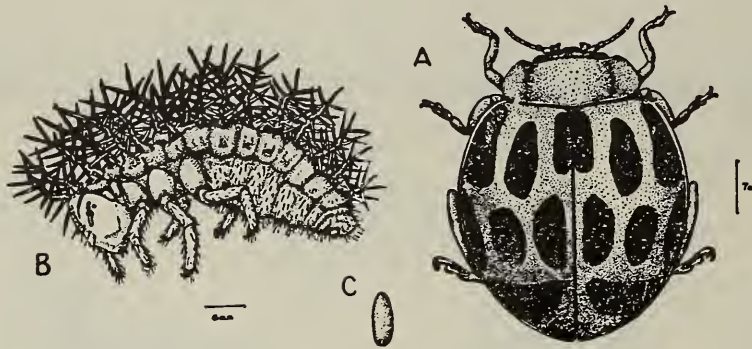


General Distribution of Epilachna paenulata

(Coccinellidae, Coleoptera)

Life History and Habits: The overwintering adults emerge and mate in the spring. The eggs are laid on the underside of tender leaves of host plants in groups of 4 to 10. They hatch in about 10 days and the young larvae begin feeding voraciously. In heavy infestations, only the skeleton of the leaf is left. Larvae mature in 15 to 20 days after passing through several molts. Pupation lasts for 10 to 15 days, after which the adults emerge and begin to feed on the leaves of host plants. Adult feeding is characterized by damage to under surface of leaf, leaving the leaf margin intact. Several generations occur annually in Uruguay, but in Argentina only 2 are reported to develop. In Argentina the adults overwinter under bark of trees or any place where they can find shelter.

Description: Adults are brownish-yellow, many black spots on the elytra in a characteristic mosaic design. (See illustration). Length of adult 9-10 mm., width 6-8 mm. Eggs cylindrical in shape, one mm. in diameter, orange-yellow in color. Larva yellowish with black head, body covered with branched, dark spines. Length about 10 mm. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 8(42) 10-17-58

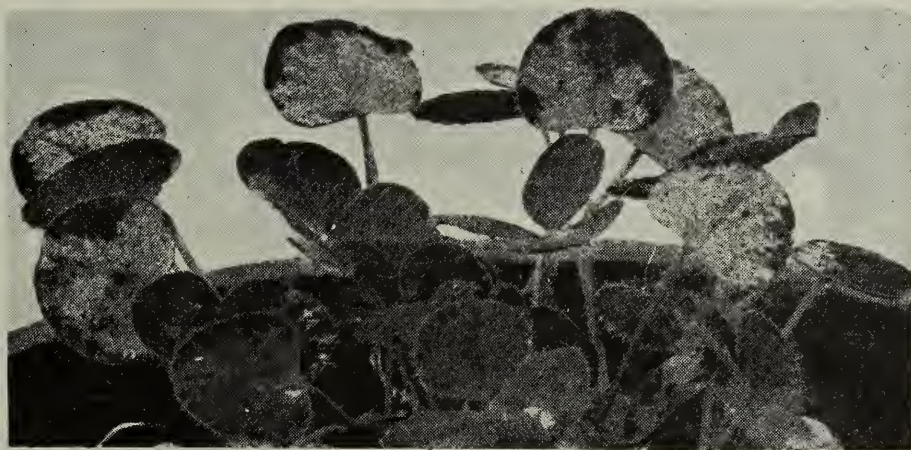


Stages of Epilachna paenulata
A-Adult, B-Larva, C-Egg

A MITE NOT KNOWN TO OCCUR IN THE UNITED STATES

RED-LEGGED EARTH MITE (Halotydeus destructor Tucker)

Economic Importance: This mite is a serious pest of vegetables and other crops, especially seedlings, in South Africa, Australia and parts of New Zealand. It is one of the chief pests of clover pastures in areas of Australia. Enormous numbers are often found on subterranean clover (Trifolium subterraneum) in that country. The mites hatch at same time as clover seeds germinate and feed heavily on the seedlings. Young clover, potatoes, tomatoes, lettuce and peas are often stunted or killed. The pest also invades greenhouses and total destruction of tomato seedlings in such locations has been recorded in the Adelaide area. Foliage of heavily attacked older plants rapidly wilts and shrivels, finally appearing scorched.



Damage to Clover

Distribution: Australia, New Zealand, South Africa.

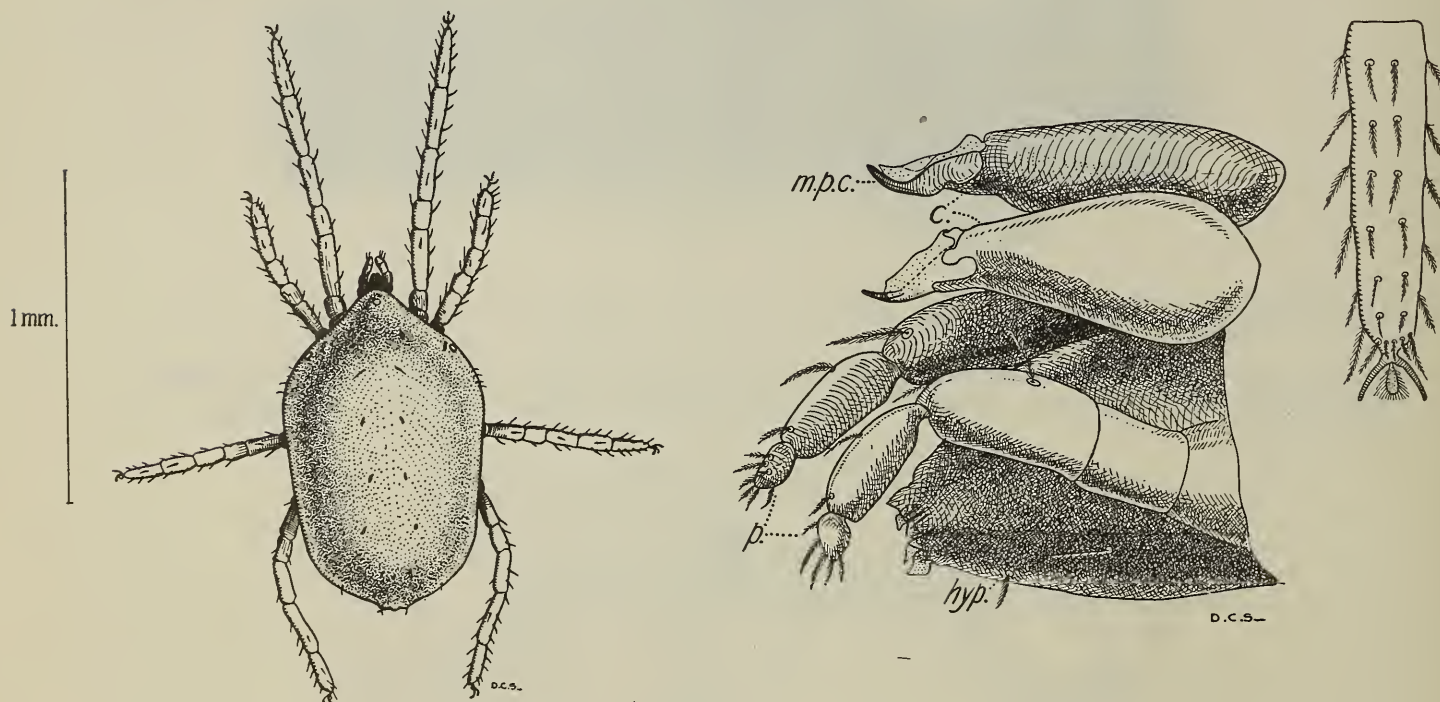
Hosts: Attacks many plants, broad-leaved preferred. Among the more important hosts are clovers, potato, tomato, tobacco, peas, beans, lettuce, and beets.



General Distribution of Red-Legged Earth Mite

Life History and Habits: In Australia the mite is active in autumn, winter and spring and passes the summer in egg stage, when other stages succumb to higher temperature and dessication. Eggs hatch in late April and May and a large population develops which frequently causes severe damage to seedlings. Infestations dwindle by early June but become high again in July and remain so to the middle of October. Oviposition occurs mostly on undersides of hosts, in damp situations where plants are near or in contact with soil. Eggs are deposited in a single layer and no webbing is present. The mites are gregarious feeders on all parts of low-growing plants. Light, sandy soils and cool, rainy weather favor development of infestations.

Description: Adult has velvety black body and red legs. Integument has very fine striae. Double row of feathered setae on dorsal surface near the mid-line. Plumose setae also on legs and ventral surface. First pair of legs longest, second shortest. Legs terminate in paired claws and median pulvilli. Two ocelli on antero-lateral margins of body. Anus terminal, genital aperture is ventral. Genital aperture large, flanked by two suckers and numerous setae. Mouthparts subterminal, palps five-jointed, chelicerae short and powerful, hypostome strongly muscular, bifurcate, terminating in chitinous papillae. Body length about 1 mm. Egg oval, less than 0.2 mm. long, bright yellow or orange. Smooth and shining when moist but whitish when dry. Young larva more elongated than adult, segmentation distinct. Nymphs assume black coloring of adults few days after hatching. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 8(16) 4-18-58



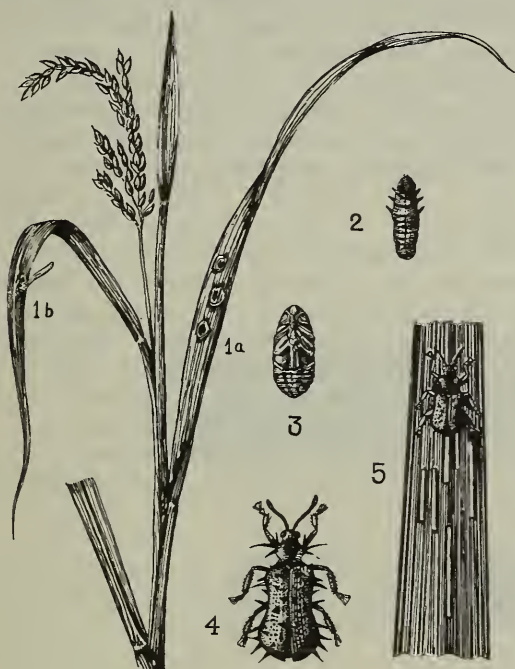
Halotydeus destructor Adult

Mouth Parts and Fore-tarsus

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

RICE HISPID (*Dicladispa armigera* (Olivier))

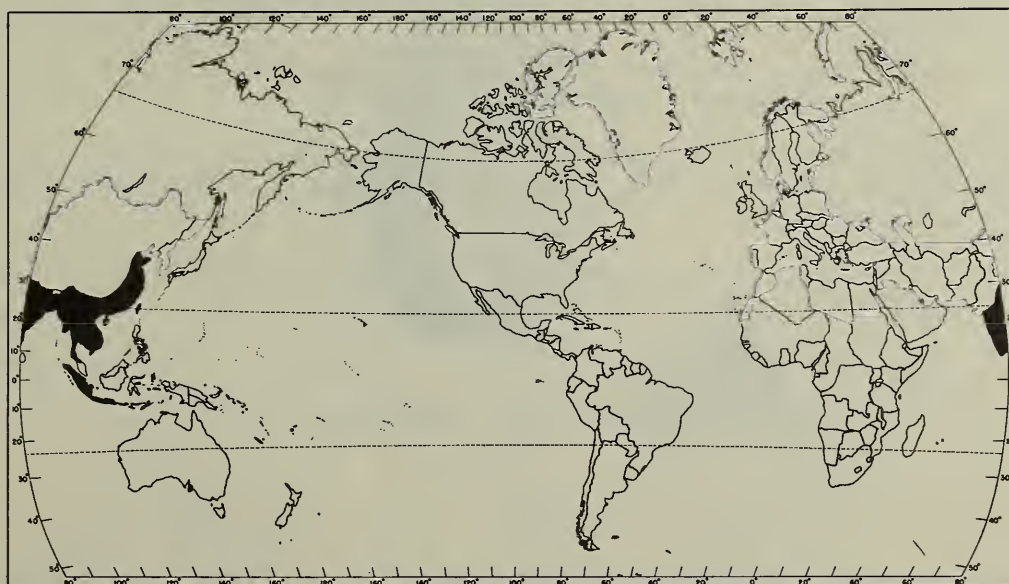
Economic Importance: This beetle is considered to be one of the most serious pests of rice in areas of India, Burma and East Pakistan. It sporadically causes serious losses to paddy rice, causing considerable damage to the leaves, particularly to rice that is standing in water. In southern Burma it is injurious practically every year from July to October and in East Pakistan from April to August. In July of 1925, 40 to 50 percent of the rice crop was lost in the Wenchow district of Chekiang, China. The pest is most injurious to rice when it is in the seedbed and just after transplanting in India and Pakistan. Large yellow spots, caused by larval mining, become evident on the leaves. The field becomes yellow, the plants wither and the leaves dry. Adult feeding causes additional leaf damage. Adults may become very abundant, at times, during the early spring when heavy migrations come from the waste-lands and surrounding jungles.



Damage to Rice

(1a) Larval mines, (1b) Egg inserted in leaf tissue, (2) Mature larva, (3) Pupa, (4) Adult, (5) Adult leaf feeding.

Distribution: Occurs throughout the Southern and eastern part of India, Nepal, East Pakistan, Burma, Thailand, Indonesia, Indochina, Formosa and the coastal part of China.

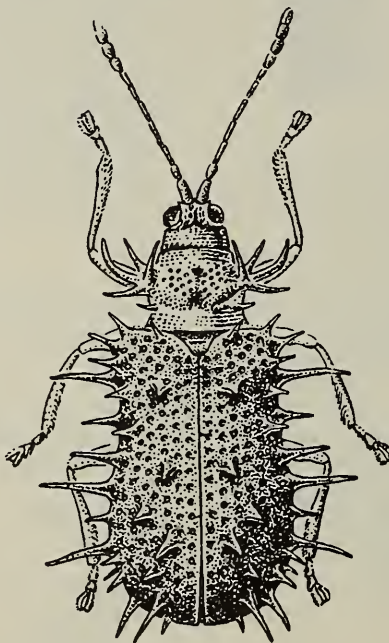


General Distribution of Rice Hispid

Hosts: Rice is the most important cultivated host, but it has also been recorded on turnips, jute, sugarcane and wild rice. Wild grasses are alternate hosts.

Life History and Habits: The eggs are laid singly on the upper surface of the leaf, each egg being inserted in the leaf tissue but almost exposed and easily visible. The egg hatches in 5-7 days and the larva mines between the upper and lower epidermis, forming a characteristic "blotch" appearance on the leaf. The larvae often emerge from the mines and crawl to other parts of the leaf or to fresh leaves. Pupation takes place in the leaf after 15 to 17 days. Generally speaking, the pest is dependent on moist conditions and attacks rice that is submerged in preference to rice on higher land from which the water has run-off. Soft-leaf varieties of rice are more susceptible to damage than the hard-leaf varieties. There are 3 or 4 generations annually in Formosa. The adult overwinters in wastelands or grasslands.

Description: The adults are small, 5 mm. from occiput to apex of elytra, metallic blue to black. Antennae are set closely together in front of head, with a small spine at the lower edge of basal antennal joint; no spines on antennal joints above. Prothorax with a single four branched spine (almost four single spines from one base) at each side in front and a single spine at each side behind. Prothorax otherwise unspined. Sides of elytra parallel, ends not truncate, numerous spines present. Larva flattened, white or yellow with black markings, first three segments broader than abdomen. Eggs oval, about 2 mm. long. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 8(40) 10-3-58



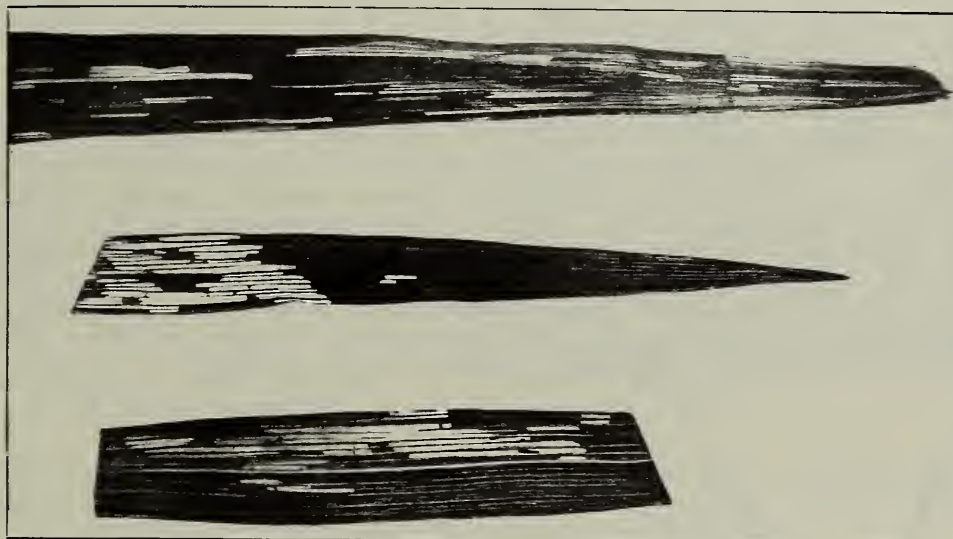
Adult of D. armigera

Figures (except map): Adult from Kalshoven, L. G. E. 1951. De Plagen van de Cultuurgewassen in Indonesie. Vol. II, pp. 515-1065. Damage and immature stages from Narayanan, E. S. 1953. Indian Farming 3(5):8-13, 31.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

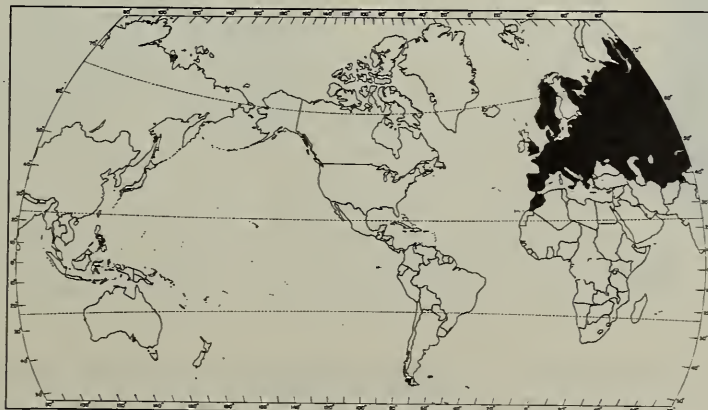
A LEAF BEETLE (Lema melanopa L.)

Economic Importance: This leaf beetle has been a serious pest of cereal crops in certain areas of Europe for many years. Damage is caused by both the adult and the larva. In Russia losses from infestations have been estimated to range from 25 to 50 percent of the crop. Serious damage occurred in Hungary in 1891 with losses estimated at between 1,000,000 and 1,250,000 pounds sterling. Attacks were so severe in the spring of 1931 in some localities in Rumania that the crop had to be plowed under. In 1938, the wheat crop in a district in Galicia, Spain, was almost totally destroyed. Losses on cereals in Spain in 1939 were estimated at 600,000 pesetas and at intervals the crop is almost totally destroyed in some areas of that country. Late varieties of wheat suffer most.



Oat Leaves Showing Typical
Injury by Larvae of Lema melanopa

Distribution: Occurs throughout most of Europe, including England and Wales in Britain, and extending into Siberia in USSR. Also recorded in Morocco in North Africa.



General Distribution of Lema melanopa

Hosts: Feeds on leaves of all cereals and grasses with barley, oats and wheat being the most important cultivated crops.

Life History and Habits: There is one generation a year in Italy. Life history is as follows: The overwintered adults mate in spring and oviposit for about 45 to 60 days on leaves of cereals. The females lay from 100 to 150 eggs each with up to 4 on a single leaf. The larvae hatch in from 7 to 15 days and feed on the leaves, migrating from one to another. They pass through 4 instars and become full-fed in 12 to 20 days and are present generally from late April to mid-June. Pupation occurs in earthen cells at depths of $\frac{1}{2}$ to 2 inches with adults emerging 20 to 25 days later. Adults feed on grasses from July to autumn, then hibernate under trash or in crevices, rarely in soil, until mid-March. In England the life cycle occupies about 46 days and of approximately the same duration in USSR. Both adults and larvae feed on cereals, the chief damage being done by the adults in the spring when food is scarce. Larval feeding on the leaves further increases the damage already caused by the adults, however.

Description: The adult is approximately 4 to 4.5 mm. in length, males being slightly smaller and narrower than the females. The head black; first two antennal segments rather globular. Thorax light reddish-brown, glossy; elytra metallic-blue with parallel perpendicular lines of punctures. Legs yellow, with tarsi and tips of tibiae black. The egg is cylindrical, rounded, 1 mm. in length, darkening to almost black before hatching. The larva is of form of Colorado potato beetle; head, spiracles and legs somewhat heavily chitinized, dark brown to black; remainder soft, more or less wrinkled, dirty to bright yellow, bearing numbers of stiff curved hairs which in the dorsal regions point forwards and on the sides upwards; nine spiracles; anus dorsal and directed forwards. Color usually obscured by a covering of excrement. Length 5 to 6 mm. The pupa is enveloped in thin transparent membrane, bright yellow, darkening rapidly until adult color is attained. Length 4 to 4.5 mm.



Adult and Larva of Lema melanopa (greatly enlarged)

Figures (except map): Larva from Venturi, F. 1942. Redia 28:11-88. Adult and damage from Hodson, W. E. H. 1929. Bul. Ent. Res. 20(1):5-14.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

COMMON CRANE FLY (Tipula oleracea L.)

Economic Importance: The larvae of this tipulid attack many agricultural crops. Cereals and crucifers have been heavily damaged in many areas of Europe. The pest is especially serious in southern Europe and in years of severe outbreaks in Italy, it may destroy entire seedbeds of rice, necessitating resowing. In Scotland, as much as two-thirds of the cereal crops may be lost.



Damage to Small Grain
by Tipula Larvae

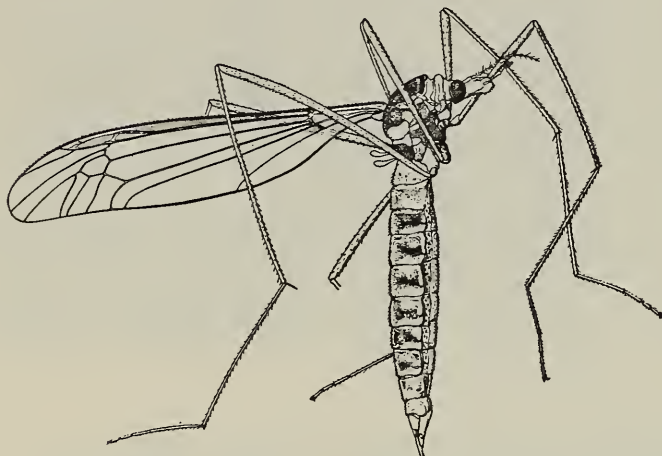
Estimates in Germany show that a larval population of 42 per square yard will cause serious injury to crops in arable land, but in grassland, twice that number can be supported. During years of mass increase, several times as many are usually present. Tipula oleracea, which is predominantly a southern European species, is one of several economically important crane flies occurring in Europe. Larvae of a European Tipula have been taken several times near St. Johns, Newfoundland, Canada. Larvae of Tipula sp. have also been intercepted in soil or on plant roots at U. S. ports of entry on occasions.

Distribution: Occurs generally throughout southern and central Europe, including the British Isles and the Mediterranean region. There have been several records of the species occurring in North Africa.

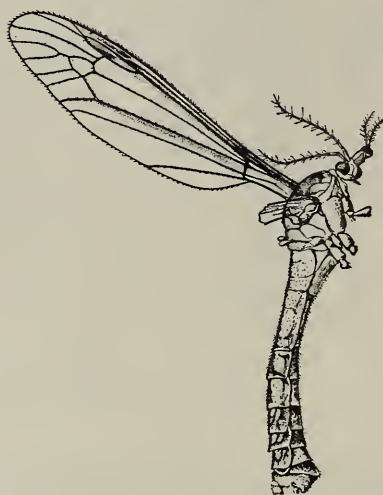
Hosts: Larvae attack crucifers, cereals and other grasses, legumes, potatoes, beets, strawberries, raspberries and various ornamentals.

Life History and Habits: Generally the adults can be found from July to late September and the larvae from the second half of August to mid-July of the following year. There are two generations a year where climate permits. Under these conditions, there is a brood of adults in May-June and another in August-September. Females normally lay about 750 eggs, but may lay up to 1,300 eggs under favorable conditions. The oviposition period lasts for approximately 10-20 days. Larvae hatch in about 14 days and normally remain active for 9-12 months before pupation, but the larval period may last up to 15 months if development is slow. Feeding occurs throughout the stage, taking place at anytime of the day underground, and above ground at night, especially when conditions are humid. The young larvae prefer green leaves of young plants to the roots. Overwintering larvae remain near the surface of the soil (6 to 8 inches) and migrate deeper only when the soil dries in the spring. Pupation takes place from mid-July to September in soil at a depth of about 2 inches. When there is only one generation, pupation lasts for 10 to 25 days.

Description: Adult male is generally silvery or dusty-gray. Eyes black, proboscis brownish; antennae 13-jointed, dark, at least first three segments testaceous; palpi brown. Thorax brownish with four pale indistinct brown stripes; metathorax and pectus grayish-white; halteres brown, blackish at ends. Abdomen slaty-gray, testaceous near tip which is upturned. Wings gray-brown, clear, wing streak whitish and rather distinct. Legs brownish; femora and tibiae darker at tips; tarsi black. Female similar to male, wings larger, longer than abdomen which is tawny at tip. Length 15 to 23 mm. Egg black, shining, reticulate, elongate-oval in shape, somewhat asymmetrical. Size 1 x 0.3 mm. Larva uniform earthy gray; shape rather conical towards head and rounded posteriorly; head black; antennae prominent; mandibles conspicuous. Length 40 mm. when fully extended. Pupa pale at transformation, darkening to blackish-brown. There is a yellow marginal streak extending along thoracic and abdominal segments and also double line of light gray crossing the segments dorso-ventrally. Abdominal spines situated on posterior margin of each segment, those at dorsal surface being smaller; caudal end spiny and pointed. Length 20-25 mm. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 8 (9) 2-28-58



Female



Male



Larva



Posterior Extremity
of Larva

Adults and Larvae of Tipula oleracea

Figures : Larvae and adults from Del Guercio, G. 1913. Redia 9: 299-345. Damage from Balachowsky, A. and Mesnil, L. 1935. Les Insectes Nuisibles aux Plantes Cultivees. 1137pp. Paris.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

LUCERNE-FLEA (Sminthurus viridis Lubbock)

Economic Importance: This springtail is a serious pest of pasture and field crops, particularly legumes. It is considered to be the most troublesome pest of clover and alfalfa in the wetter parts of South Australia, and has been recorded as damaging on occasions in Europe. It is active only during the wet

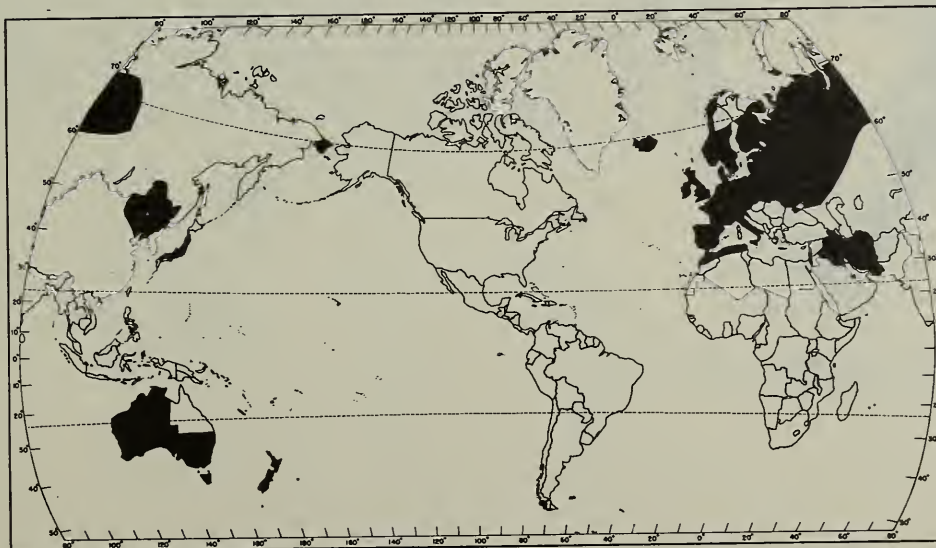
season, the length of the period varying according to the district or type of season. There are usually two peak populations during a season, one during the fall and one in the spring. Populations of as many as 1,298 per square foot have been recorded in New Zealand. During May of 1937 in that country, it was determined that 38 percent of the weight loss of subterranean clover was attributed to lucerne-flea in a section of North Island.

Distribution: Most of Europe, including the British Isles, and the northern coast of Africa. Also recorded from Israel, Iceland, Iraq, Iran, Japan, China, New Zealand and Australia (except Queensland).

Hosts: A pest of many plants, but prefers legumes such as clover, alfalfa and peas. Truck crops such as lettuce, turnips and carrots are attacked, especially in seedling stage. Young barley, oats and wheat are sometimes damaged on heavy soils.



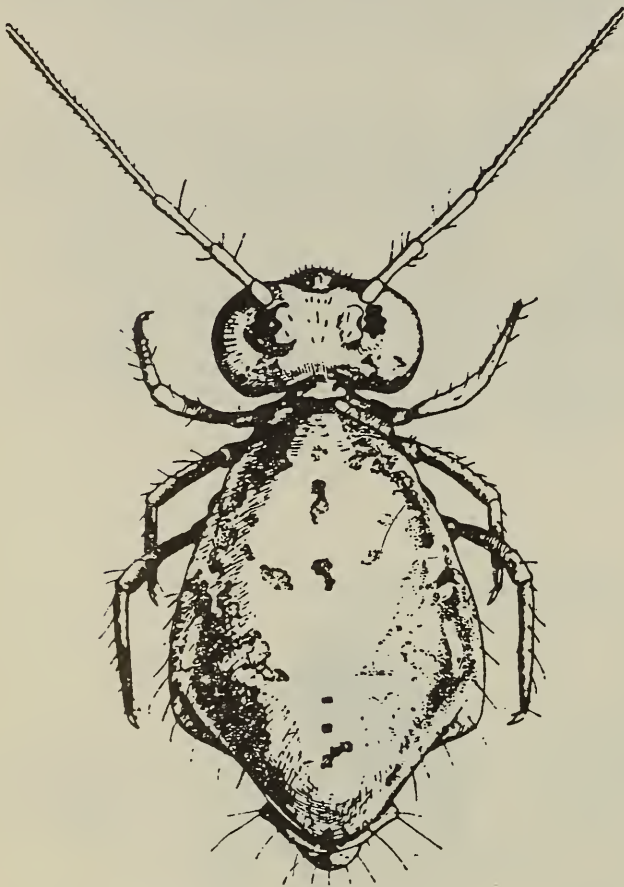
Damage to Clover



General Distribution of Lucerne-flea

(Sminthuridae, Collembola)

Life History and Habits: The eggs are laid on the soil, usually in little batches or heaps of 50 or 60. They are covered with a fluid which upon drying, renders the eggs very difficult to find. Under favorable conditions, eggs hatch in 3 to 4 days in Western Australia. Incubation of the eggs is governed principally by soil moisture. Nymphal development normally takes place in about a month, but varies greatly with weather conditions. The mean monthly temperatures ranging between 52°F. and 60°F. accompanied by adequate soil moisture, offer optimum conditions for population growth in New Zealand. In unfavorable conditions, the insect survives in the egg stage. In Scotland, the unfavorable period is winter, when development is inhibited by low temperature, while in South and Western Australia, the unfavorable conditions are in the summer when development is inhibited by low relative humidity. Feeding injury is quite characteristic; small irregular portions of leaf may be eaten away, leaving a ragged hole, or lower surface of leaf may be left intact as a whitish film. The adult jumps rapidly when disturbed, moving distances of up to 12 inches at a time.



Sminthurus viridis Adult

Description: The eggs are yellowish and cylindrical, measuring approximately .25 mm. Newly emerged nymphs are less than 1 mm. in length and yellow in color. As growth progresses, a greenish tinge appears. The adult is about 2.5 mm. in length; body soft and somewhat globular; general color greenish or greenish-yellow with irregular darker patches on the abdomen. It is wingless in all stages and young nymphs resemble the adults except in size.

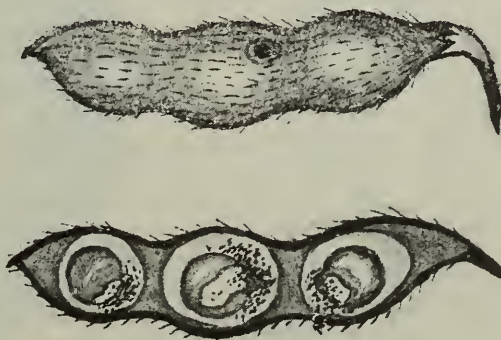
(Prepared in Plant Pest Survey
Section in cooperation with other
ARS agencies.) CEIR 8(13) 3-28-58

Figures (except map): *S. viridis*
adult from Jenkins, C. F. H. and
Forte, P. N. 1948. Jour. Agr. West.
Austral. 25(2):116-120. Damage from
Dumbleton, L. J. 1938. New Zealand
Jour. Sci. and Tech. 20(4A):197A-211A.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

SOYBEAN POD BORER (Grapholitha glycinivorella (Matsumura))

Economic Importance: The soybean pod borer is a well known pest of soybeans in the Far East. It is widely distributed in Japan and causes serious damage every year in Hokkaido where it has attacked up to 94 percent of the beans in some localities. Seed losses up to 20-30 percent have been recorded in some years in the Soviet Far East. Infestations are apparently worse on the "hairy" varieties and those that flower before the end of July in Manchuria and on the late varieties in Korea. Two seeds in each pod are usually attacked. These are ruined for seeding purposes and the oil content is reduced.



Damage to Soybeans and Pods

Distribution: Occurs throughout Japan, Korea, and parts of China (Manchuria) and the Soviet Far East (Maritime Territory, Sakhalin).



General Distribution of Soybean Pod Borer

Hosts: Preferred host is soybean. Will also attack cowpeas and sundial lupine (Lupinus perennis).

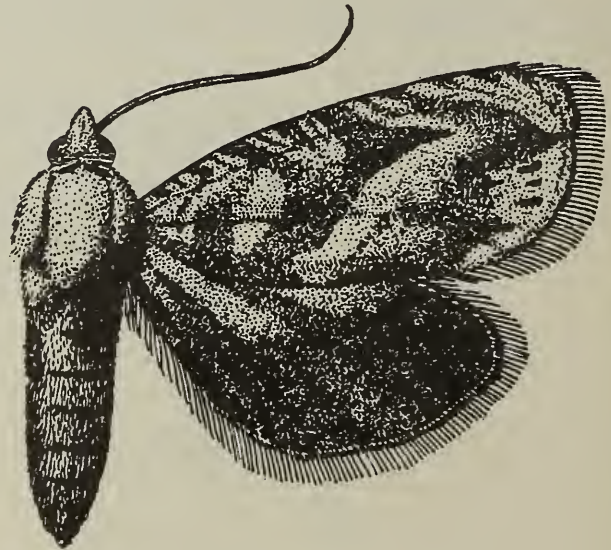
Olethreutidae, Lepidoptera

Life History and Habits: In Manchuria there is but one generation a year; the adults first appearing in August and early September, living for about 10 to 13 days. The females lay eggs singly, 164 to 167 per female, on the pods, and sometimes just before harvest, on the leaves and stems. The larvae hatch in 7 to 8 days and are full-fed in 18 to 21 days. They enter the soil to hibernate in cocoons. Pupation begins late in July the following year and moths emerge in 11 to 13 days. Young larvae feed on the young green seeds. Infested beans are difficult to detect by examinations of the outside hull. Usually a small spot, as though splashed with mud, indicates the entrance hole.

Description: The adult is as follows: "Primaries grayish-black, mottled with dull yellow irregular markings, with indigo luster in a certain light; outer half of the costal margin distinctly crossed alternately by short oblique yellow and dark liturae; a curved dark narrow stripe near at the costal margin towards the inner angle ending at the place of the second dorsal vein, after making an acute angle at the subcostal region; a large wedge shaped dusky patch nearly parallel with the former belt at the interno-outer margin, with the broad base at the hind margin; outer margin dull yellow, and there is a golden patch near at the center furnished with three black spots internally in a transverse row; a blackish oblique stripe at the apical region, bordered exteriorly with grayish-blue; a submarginal line and the fringe dusky gray. Secondaries dusky black, a little paler towards the base, with gray fringe and costal margin. Body dull black; head with a crown-like tuft of an olivaceous-yellow color. Wings below altogether paler and more uniform in color, with no markings except on the costal margin. Body beneath gray; legs, antennae, labial palp, yellowish-gray; compound eyes olivaceous. Wing expanse - 13 to 15 mm.; body length - 7 mm." (from Matsumura, 1898). The eggs are yellowish when laid and the caterpillars are rosy-orange when mature. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies and the U. S. National Museum). CEIR 8(1) 1-3-58



Larva



Adult

Figures (except map): Adult from *Iconographia Insectorum Japonicorum*, 2nd Edit. 1954. 1736 pp., Tokyo. Larva and damage from Engel'gardt, V. and Mishchenko, A. 1931. In *Bolezni i Vrediteli Soevykh Bobov na Dal'nem Vostoke. Dal'nevostochnoe Kraevoe Zemel'noe Upravlenie Dal'stazra*. pp. 85-112, Vladivostok.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

APPLE CAPSID (Plesiocoris rugicollis (Fallen))

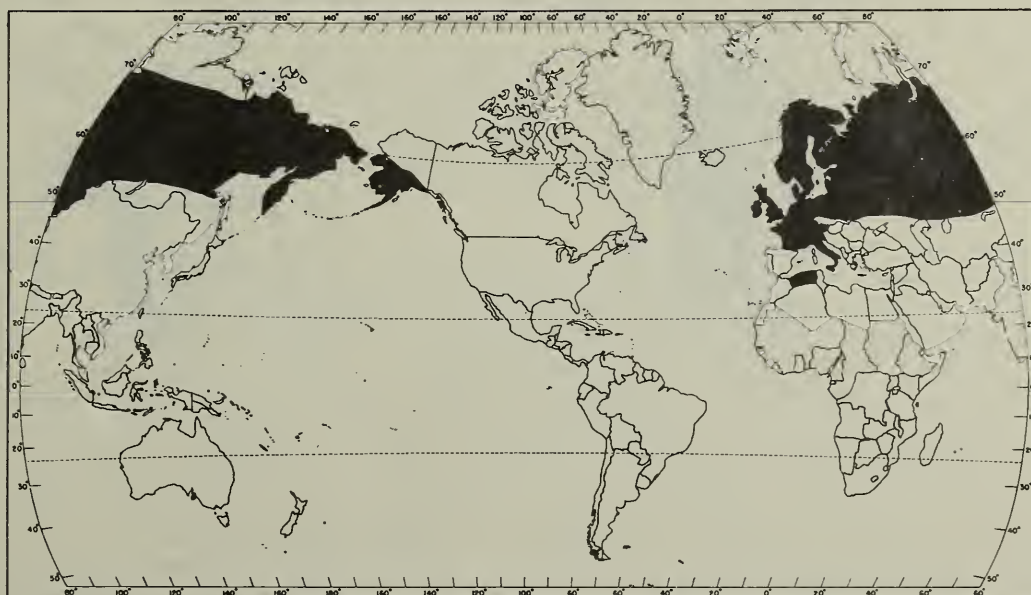
Economic Importance: This mirid is a pest of several fruit and ornamental trees in the palearctic regions of Europe and Asia. It has been considered the most

serious pest of apples in Britain. Entire crops of apples have been made unsalable due to deformed fruit. On apple, infestations produce deformed, ragged and undersized leaves. The shoots are also killed. This encourages formation of excessive side shoots, resulting in a badly shaped, stunted tree. The most obvious damage is on the fruit. The skin is rough and russeted with scattered pits and pimples. Severely damaged fruits often have deep cracks. In addition to apples, black currants are often severely damaged, the foliage being almost totally destroyed on occasions.



Damage to Apple

Distribution: Apple capsid has been generally recorded throughout northern and central Europe and through the palearctic region of Siberia. It has also been recorded in Algeria and Italy in the Mediterranean area and in parts of Alaska on the North American Continent.



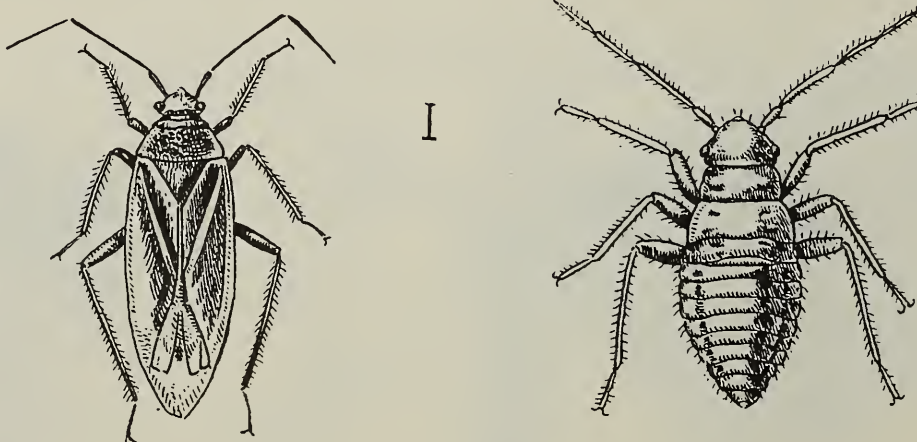
General Distribution of Apple Capsid

(Miridae, Hemiptera)

Hosts: Apple, currant and willow are major hosts. Gooseberry, cherry, pear, alder and hazel have also been recorded as hosts.

Life History and Habits: On apple, the eggs are usually laid under the bark of twigs, but sometimes on the heavy branches and the trunk of the trees. In heavy infestations, up to 6 eggs per inch of twig have been found. The young nymphs usually begin to appear in mid-April in England, and feed on the developing leaves and flower buds. They develop very rapidly and become mature in 2 to 3 weeks. The adults are quite active, falling, running or flying short distances when disturbed. Egg-laying occurs from mid-June to mid-July and adults disappear usually by mid-August. The eggs remain dormant until the following spring. There is only one generation a year in England.

Description: Egg is elongate, about 1.6 mm. in length, translucent white in color. Nymph is bright green and resembles the adult. Adult is also bright green; head, pronotum, sides, hemelytra and legs yellow. Antennae with third and fourth joints and the extreme apex of second joint black, fourth joint about two-thirds as long as the third; pronotum only slightly raised, posteriorly strongly rugose transversely, sides straight; scutellum slightly convex towards the apex, raised down the middle; hemelytra indifferently punctured, membrane nearly hyaline, veins green; tarsi black at apex or entirely so, sometimes apex of tibiae of same color. Adult length 6 mm. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.)
CEIR 8 (24) 6-13-58



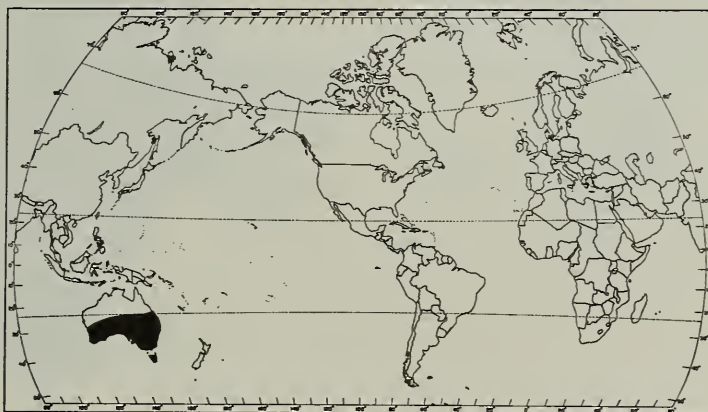
Adult and Nymph of Plesiocoris rugicollis

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

APPLE THRIPS* (Thrips imaginis Bagnall)

Economic Importance: Outbreaks of this species, which is indigenous to Australia, cause extensive damage to pears, apples and other fruits during some years. Sometimes attacks by T. imaginis will completely destroy the setting of young fruits. The attack was so severe in Victoria during 1926 that all fruit crops, including strawberries and cane fruits, were a complete loss. T. imaginis is chiefly a pest in the spring and early summer, but severe outbreaks may occur in the autumn. As many as 2,800 per rose blossom have been found in Sydney during October. Damaging populations depend largely on meteorological conditions. If weather is unfavorable during October and November, thrips will not be serious even if large numbers survive the previous winter. A warm, wet, autumn favors a buildup, and often immense swarms will appear when these conditions are encountered. The species does not appear in damaging numbers in Tasmania.

Distribution: Occurs throughout southern Australia and Tasmania.



General Distribution of Thrips imaginis

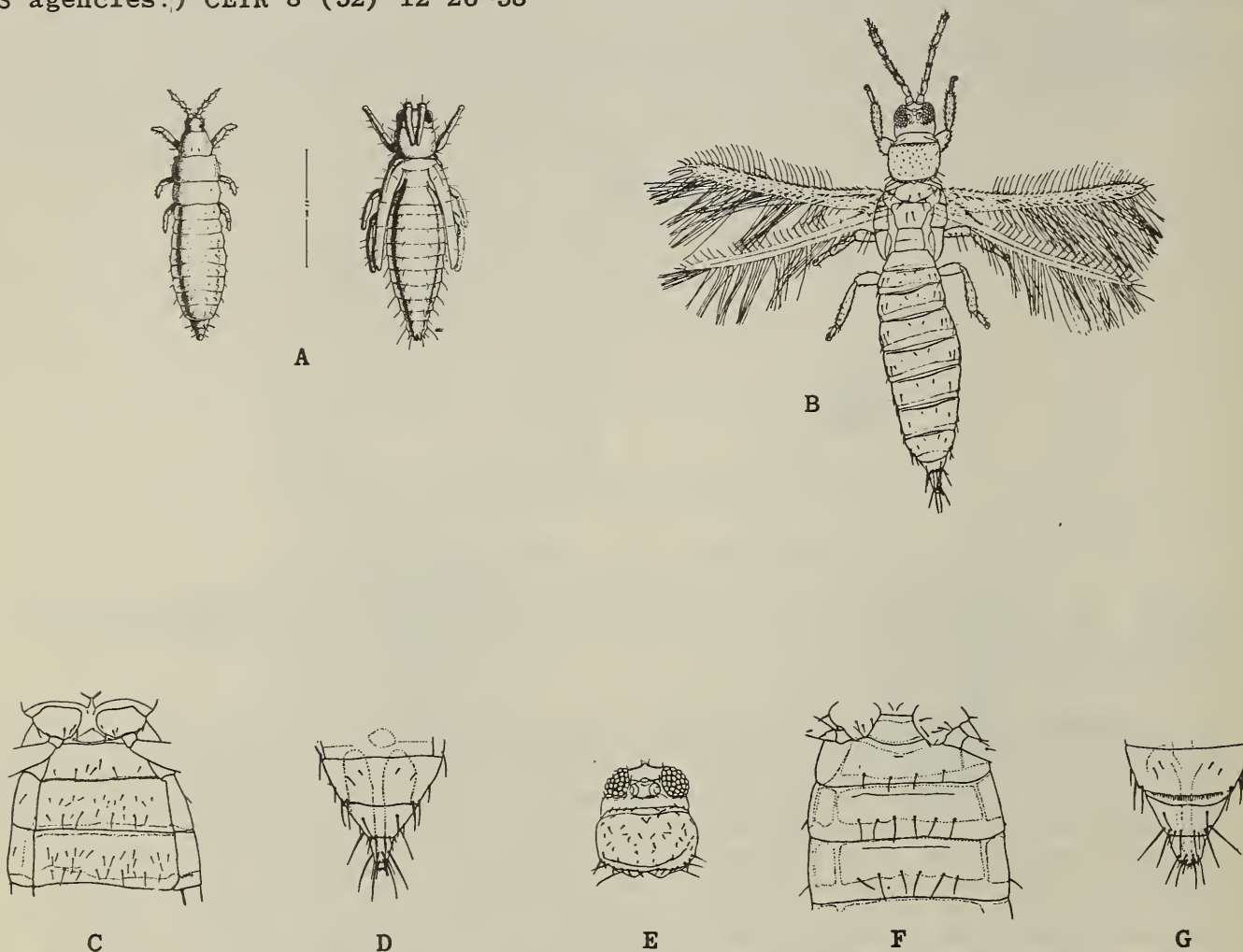
Hosts: Attacks the flowers of many plants; most serious on deciduous fruits though occasionally it becomes serious on other crops such as tomatoes and strawberries.

Life History and Habits: The adults may be found throughout the year in South Australia, but populations fluctuate according to climatic conditions. Egg laying occurs through the female's life span, the average number varying from 186 to 251. Eggs are laid in the tissues of the flowers, including the stamens and pistils, and occasionally on young tender leaves of host plants. Newly hatched nymphs feed on epidermal cells causing a "browning" of the petals and destruction of the stamens and pistils. During an infestation year, 150 individuals may be present in each blossom. After passing through the second nymphal stage, the insect leaves the plant and enters the soil to pupate. Immature development varies considerably, the average being about 10 to 12 days at 23° C. Diapause is passed in the pupal stage in the soil or in the adult stage in sheltered conditions. Activity increases rapidly during the first warm days in the spring. The extent of spring peaks depends upon the extent of the previous autumn population, survival during the winter and character of the prevailing spring weather. Several other species of thrips

*Also called plague thrips. (Thripidae, Thysanoptera)

inhabit blossoms in association with T. imagnis; particularly T. tabaci which closely resembles this species.

Description: Adult female about 1 mm. long and about .25 mm wide at thorax. Anterior portion of body golden-brown with reddish tinge; posterior area brownish-yellow to darker brown. Newly emerged adults yellowish. Male smaller and lighter in color than female; abdomen pale-yellow. T. imagnis adults may be separated from T. tabaci as follows: T. tabaci have only primary setae on abdominal sternites 2-7, consisting of row of 6 setae across posterior margin of segment. T. imagnis has primary setae and in addition an irregular accessory row of setae across the middle of sternites 2-7 (often only 1 or 2 on sternite 2). Accessory setae are finer and shorter than primaries. Ocellar crescents bright red in T. imagnis and gray in T. tabaci. Gray color in T. tabaci often difficult to see because of orange internal pigment behind, but pigment usually present elsewhere in body. No similar pigment in body of T. imagnis like that in ocellar crescents. Nymphs of T. imagnis generally orange-yellow and T. tabaci lemon-yellow. (Prepared in Plant Pest Survey in cooperation with other ARS agencies.) CEIR 8 (52) 12-26-58



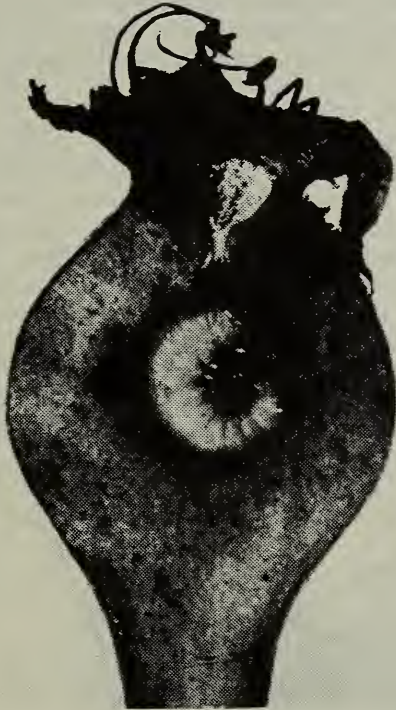
Nymph, Pupa (A) and Adult (B) of T. imagnis. Anterior Abdominal Sternites (C), Posterior Abdominal Tergites (D) and Head and Prothorax (E) of T. imagnis. Anterior Abdominal Sternites (F) and Posterior Abdominal Tergites (G) of T. tabaci.

Figures (except map): Adult, head, prothorax, sternites and tergites from Vevers Steele, H. 1934. Austral. Council for Sci. and Indus. Res. Pamph 54, 59 pp. Nymph and Pupa from Davidson, J. 1936. South Australia Dept. Agr. Jour. 39(7): 930-939.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

PEAR SAWFLY (Hoplocampa brevis (Klug))

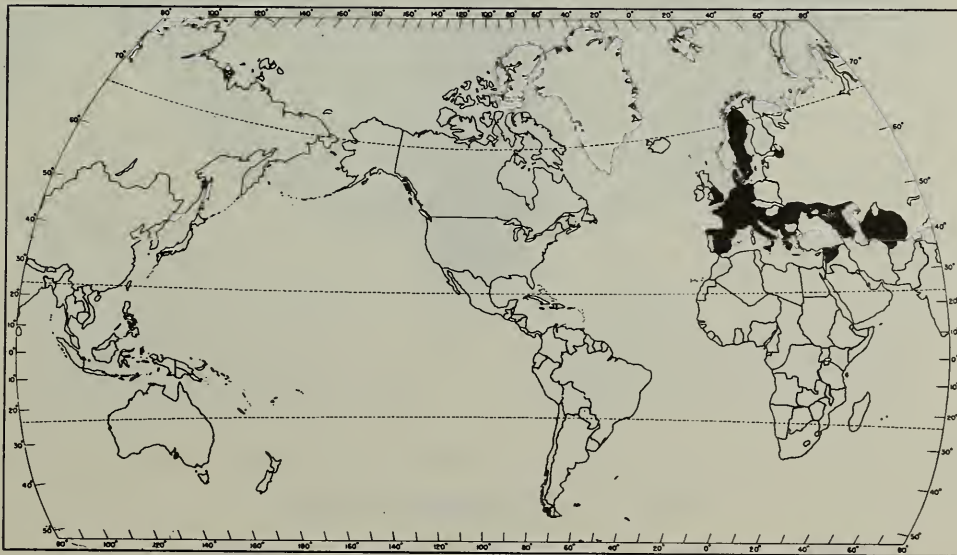
Economic Importance: This tenthredinid is an important pest of pears in many areas of Europe. Although infestations are not consistent from year to year, it is generally considered to be a very harmful species. Populations will remain unnoted for awhile, then suddenly appear in very destructive numbers. In some years as high as 80 percent of the fruits will be attacked but infestations may be highly localized in fruit growing areas. During 1938-39, 60 to 80 percent of the pears were attacked in the Crimea of USSR.



Distribution: Occurs in European USSR, Romania, Greece, Italy, Netherlands, Britain (England), France, Yugoslavia, Denmark, Germany, Sweden, Spain, Belgium, Switzerland and Austria in Europe and in Syria and USSR (Turkestan) in Asia.

Hosts: Pear is the major host. Also attacks plum and apple.

Damage to Pears



General Distribution of Pear Sawfly

Life History and Habits: Life history of H. brevis in the Crimea of USSR is as follows: Larvae overwinter in cocoons in the soil, some just below the surface and some at depths down to 8 inches. Pupation occurs in mid-March. The adults appear when pear buds are separating, being present for 8 to 10 days. Reproduction is parthenogenetic. The females contain fully developed eggs upon emergence. Each female deposits from 37 to 40 eggs, singly, on the lower halves of the flower buds. There are usually 4 eggs per bud. Larvae hatch in 6 to 8 days and feed within developing fruits, destroying seeds and migrating from one fruit to another until full-fed. Feeding lasts from 21 to 23 days during which each larva will damage up to 4 fruitlets and pass through five larval instars. In mid-May, the mature larvae drop to the ground, usually in the infested fruitlets, and then enter the soil to overwinter. Some larvae will not pupate the following spring, but will remain dormant until the succeeding year.

Description: Adult is 4-5 mm. in length. Mesonotum brown, spotted black. Stigma light yellow, base brownish. Head and antennae brownish-yellow without black coloring apart from the eyes. Thorax reddish-yellow, mesonotum somewhat darker with dark streaks on the individual sclerites and on base of scutum. Metanotum black. Mesonotum densely punctured, almost mat. Legs yellow, wing hyaline with yellow veins. Dorsal surface of abdomen black, ventral surface yellow. Egg is white and translucent, measuring 0.7 by 0.26 mm. Fifth-instar larvae is about 7 to 9 mm. long; head with brown spot on frons, otherwise tan; no conspicuous caudal tergites. The body and legs are pale green and claws brown. There is a slight darkening of the dorsal surface of the anal segment, somewhat less on ninth segment and slightly noticeable on eight segment. The cocoons are dark brown and rough-coated due to sand particles adhering to surface. They vary in length from 5.9 to 6.2 mm. and in width from 2.9 to 3.3 mm. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 8(26) 6-27-58



Adult of Hoplocampa brevis

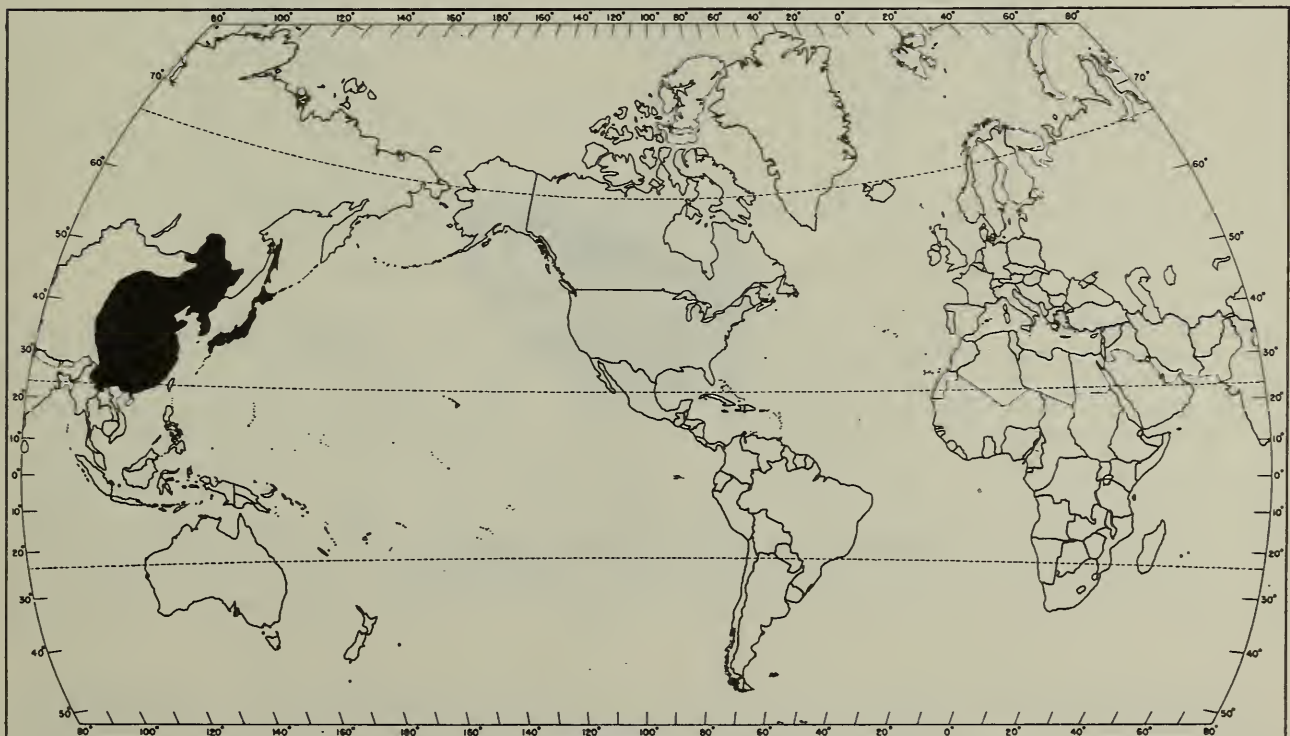
INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

PEACH FRUIT MOTH (Carposina niponensis Walsingham)

Economic Importance: This carposinid is considered one of the most important pests of pome fruits in the Far East. It is very serious on apples in Japan, Korea, Manchuria and China, and may cause heavy losses if not controlled. Damage to peaches is often confused with that caused by Oriental fruit moth (Grapholitha molesta (Busck)) in Japan and Korea. With the increased amount of travel to and from Japan in the past several years, a correspondingly greater number of interceptions of C. niponensis have occurred at U. S. ports of entry. From 1948 until 1954, it was taken 14 times, mostly from apples originating in Japan.

Hosts: Peach, apple, pear, plum, apricot, quince, nectarine and similar fruits.

Distribution: Occurs throughout Japan and Korea, and is widespread in China and Manchuria. Also recorded in the literature in the Soviet Far East (Sakhalin).



General Distribution of Peach Fruit Moth

(Carposinidae, Lepidoptera)

Life History and Habits: From one to three generations a year have been recorded, but two generations a year seem to be more common. The first brood of adults appears in late May and June on Honshu (Japan), the second from middle of July to early August and the third the middle of August to early September. In areas where there is only one generation, the adults emerge in May or June with hibernation following. Hibernating larvae are larger than those that pupate and emerge the same year. The adults are nocturnal, depositing eggs in clusters, ranging from 3 to 70 eggs, on or near the fruits. Each female will lay about 200 eggs. Larvae hatch in 5-8 days, develop in 12 to 18 days, first crawling about gregariously for a short time, feeding slightly, then boring into the fruits at the calyx end. They tunnel all parts of the fruit, feeding on fleshy parts as well as the seeds. Damage resembles that caused by the apple maggot, but does not resemble damage by codling moth. Several larvae may feed in each fruit. On peach the entrance hole is noticeable because of the presence of a small amount of secretion on the surface of fruit, but on apple only a light, brownish colored secretion is present. Pupation lasts about two weeks and takes place in shallow cells in the ground under the trees.

Description: Adult small, 6-9 mm. long, wing expanse about 15-19 mm. Color dark mottled gray. Forewings long and narrow, hind wings with fringe of long scales. Resembles many other species of family. Eggs elliptical, 0.44 x 0.36 mm. Attachment end pointed, apical end blunt and rounded, light yellowish-brown with chorion granulated. Newly hatched larva orange-red, changes to milky-white, then back to orange-red at maturity. Mature larva 13 mm. long. Pupa typical of group, reddish-brown. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.). CEIR 8(34) 8-22-58



Female of Carposina niponensis

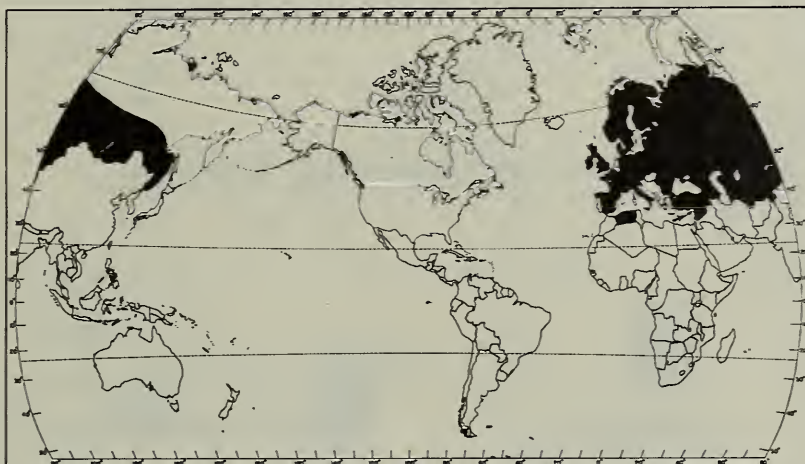
INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

PLUM FRUIT MOTH* (Laspeyresia funebrana (Treitschke))

Economic Importance: Plum fruit moth or red plum maggot is a serious pest of plum in wide areas of Europe. Its damage has also been reported from Western Asia and North Africa. In some years as much as three-fourths of the plum crop has been lost to this insect in France. Over 60 percent of the prunes are infested annually in the Black Sea area of the Caucasus (USSR) where the moth is regarded as the most important pest of the crop. It is also one of the main pests of plums in Turkestan (USSR) and in the British Isles. Large consignments of plums were condemned at canneries in England in 1935 because of red plum maggot. Other stone fruits are also attacked but apparently plum is the preferred host.

Distribution: Temperate Europe through Siberia (USSR), Asia Minor, North Africa.

Hosts: Plum, peach, cherry and other stone fruits. Also reported from apple and walnut.



General Distribution of Plum Fruit Moth

Life History and Habits: The biology is not fully known. In France it has one, perhaps two, generations a year. The late appearing moths may represent an extended emergence period. The first adults appear about the end of June when plums are approaching maturity. Eggs are deposited at the base of the stalk of the fruit and hatch in about 10 days. The young larva bores into the tissues leaving a conspicuous entrance hole surrounded by frass. From the stem the larva migrates into the pulp of the fruit and tunnels around the stone leaving behind it rotting tissue mixed with excrement. By the end of August the larva is fully fed and bores out of the fruit. A gummy exudate often forms at the exit hole. The larva then seeks hibernation quarters such as cracks and crevices in the bark. There it spins a cocoon in which it pupates the following spring.

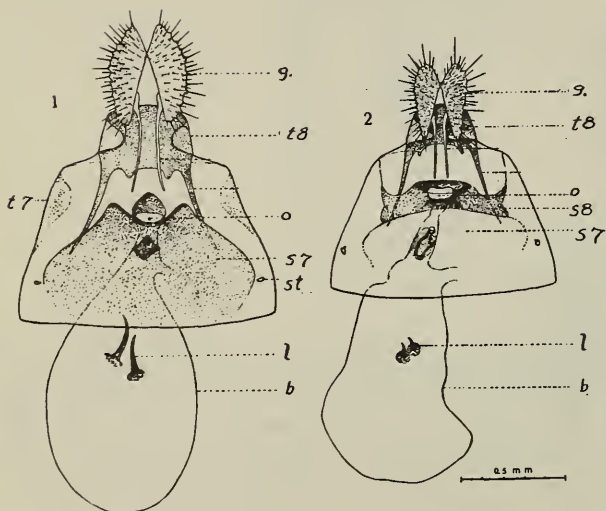
Description: The moth is smaller than the codling moth, having an expanse of 10-14 mm. It is generally dark gray and has some external resemblance to oriental fruit moth. The hindwings are uniformly dark brown, a little more clear than the forewings. The insect is thickset; wings are rectangular, large,

*Larva called red plum maggot and adults also known as plum tortricid (Tortricidae, Lepidoptera).

strongly truncate on extremities and have a poorly developed marginal fringe. The genitalia of L. funebrana differ from those of Carpocapsa pomonella as illustrated below. The larva attains a length of 10 mm. It is more slender than C. pomonella and the reddish color lighter, almost white, with the head and thoracic plate black. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies and the U. S. N. M.) CEIR 8 (49) 12-5-58

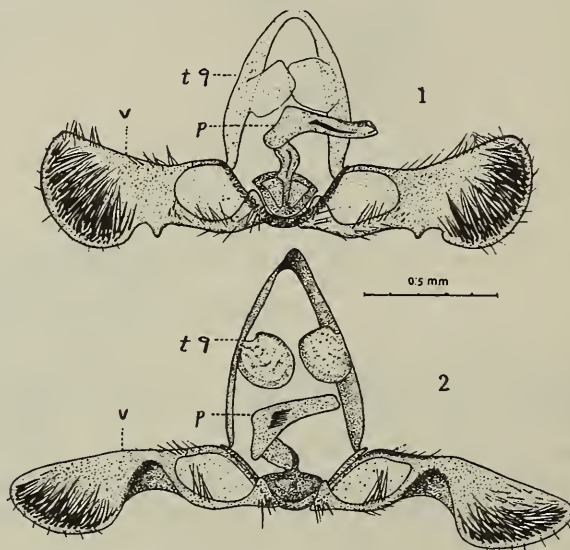


Adult and Larva of Laspeyresia funebrana



Female Genitalia of L. funebrana (1)
and Grapholitha molesta (2)

g.- gonapophyses; t8,s8 - tergite & sternite of 8th abdominal segment
t7,s7-tergite & sternite of 7th abdominal segment; o - orifice of bursa copulatrix; b - bursa copulatrix; st - stigmata; l - laminae dentatae



Male Genitalia of L. funebrana (1)
and Grapholitha molesta (2)

v - valves of forceps; p - copulatory organ; t9 - tergite of 9th abdominal segment.

Figures (except map): Adult from Entomologia Agraria, 1915. Manuale. 483 pp. Firenze. Other figures from Bovey, P. 1937. Rev. de Path. Veget. et d'Ent. Agr. de France 24(3/4):189-317.

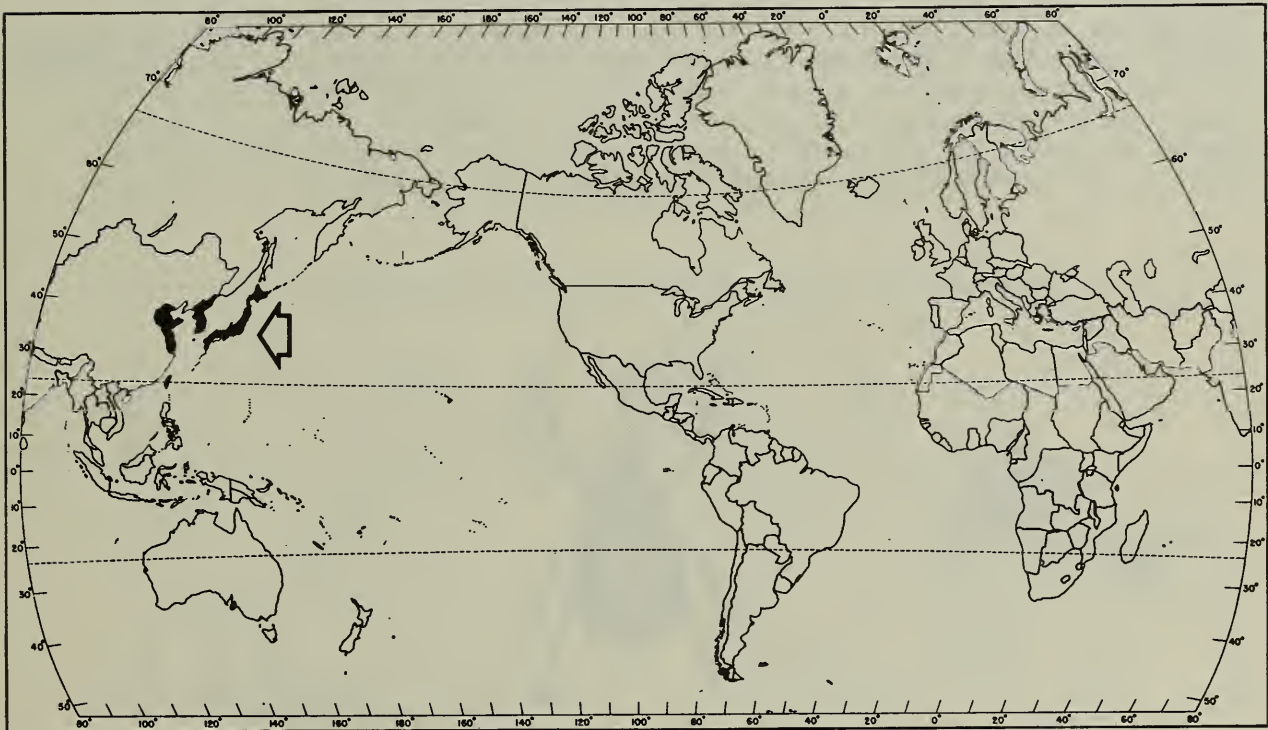
INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

FRUIT WEEVIL* (Rhynchites heros Roelofs)

Economic Importance: Destruction of the fruit and fruiting twigs of host trees by this curculionid may be practically complete in severe infestations. The pest is common throughout most of Japan, Korea and in areas of China. Serious injury has occurred on pear in the latter country. After oviposition, the adults cut into the fruits which then drop to the ground. One adult may cause considerable fruit-drop from each tree.

Hosts: Attacks peach, pear, apple, cherry, apricot, plum, quince, loquat and fig. Most severe on loquat and peach in Japan.

Distribution: Known to occur in Japan, Korea, Formosa and areas of China.



General Distribution of Fruit Weevil

* Also called peach weevil (Curculionidae, Coleoptera)

Life History and Habits: Overwintering adults appear in April and begin to feed on young buds. Mating starts in 3 to 4 days and oviposition 2 days later. Deep holes about 7 mm. are eaten into the young fruit after which the female deposits from one to three eggs in each cavity. Usually only one excavation is made in each fruit, but when populations are abundant, two or more egg cavities may be made. About 35 to 50 eggs are produced by each female. A gelatinous secretion from the mouth is placed over the hole in the fruit. The eggs hatch in about a week and the larvae feed and develop in the soft seed or seed cavities of the fruit. They sometimes may leave the fruit and feed on roots of weeds and decaying vegetables. The larval period requires 40 to 50 days. Pupation takes place in the soil and lasts 3 to 4 weeks. Late-maturing larvae hibernate in earthen cells and pupate in the spring. Adults live practically all summer and continue to attack available fruits. There is one generation a year. Adults are active at night, feeding on all parts of the tree. Adults may be jarred from trees in the same manner as the plum curculio.

Description: The adult is large, 10 mm. long, iridescent, reddish-purple in color, robust, with a long thick snout. It is covered with soft, dark red hairs. Body and wings densely, coarsely punctuate and furrowed. Legs long, the front pair particularly heavy. Eggs are elliptical, milk-white, about 0.7 mm. in length. Larvae 12 mm. when mature, fat with row of thorn-like cuticular projections on each segment of body. Pupae yellow, naked; long white cuticular thorns on back of head, venter of thorax, and each abdominal segment. A pair of brown thorns is found at anal end of body. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 8(15) 4-11-58



Rhynchites heros Adult

Figure of adult from Iconographia Insectorum Japonicorum, 2nd. edit., 1954. 1736 pp., Tokyo.

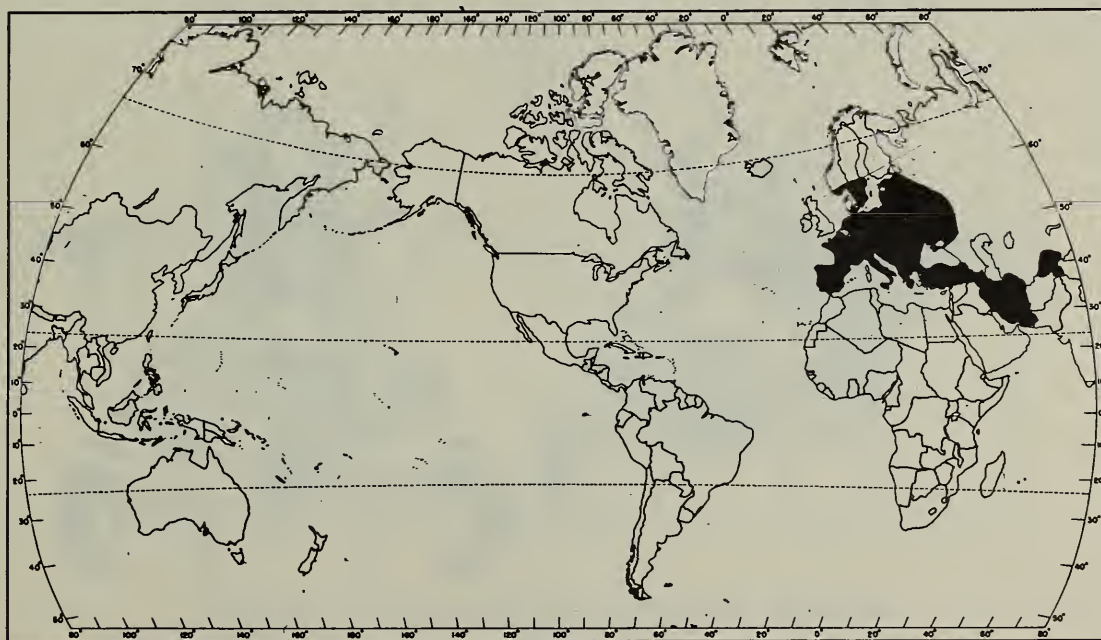
INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

EUROPEAN CHERRY FRUIT FLY (Rhagoletis cerasi L.)

Economic Importance: This tephritid is considered to be one of the most serious pests of cherries in Europe. It frequently causes severe damage in central European countries and in recent years has caused severe damage in southern Norway. In Bulgaria in 1929, from 80 to 100 percent of the fruit was damaged in many instances. Infestations in Norway are frequently over 90 percent. Considerable loss occurs in the preserve industry in Germany and further loss is realized in this country from cherry import restrictions operating in Great Britain and other countries. In the past few years it has been intercepted in increasing numbers at U. S. ports of entry. As many as 31 interceptions have been reported at Atlantic Coast ports in a season.

Hosts: The major host is cherry, but it will also attack several other species of Prunus. Lonicera tatarica and L. xylosteum appear to be important alternate hosts, though they are not preferred.

Distribution: Occurs throughout most of Continental Europe and parts of Turkey and Iran in Asia. In USSR extends from southern Leningrad Province to the Crimea and in southeastern Kazakhstan.

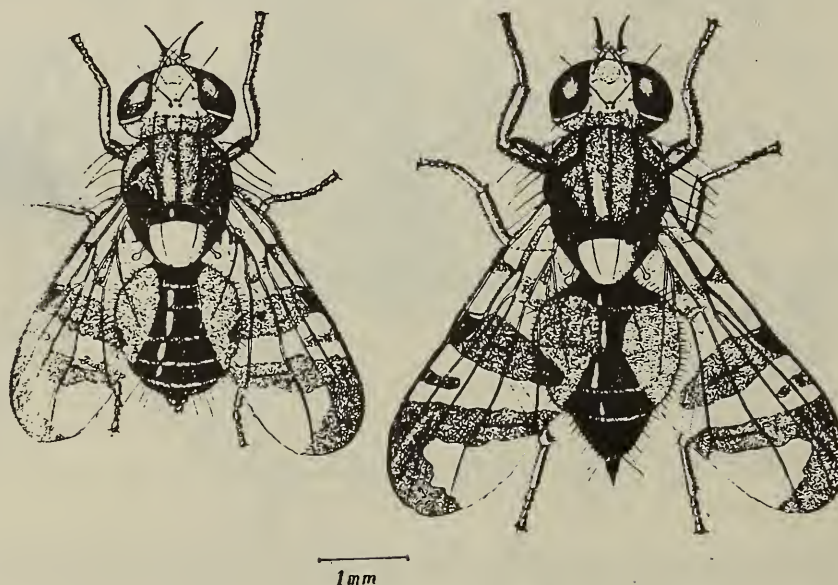


General Distribution of Rhagoletis cerasi

(Tephritidae, Diptera)

Life History and Habits: In France the adults emerge from the overwintering pupal cases in early May. They begin feeding shortly afterward upon the secretions on the tree. Unfed females cannot become sexually mature. Newly emerged adults are sluggish and are easily captured. Weather greatly influences the activity of the adults. They remain immobile on cold cloudy days. In about 11 days the females begin laying eggs in fruits, each laying from 50 to 60 with a maximum of 100. The eggs are placed beneath the epidermis, usually one per fruit. Incubation lasts from 6 to 12 days, varying with temperature. Larval development averages 30 days. When mature, the larvae leave the fruit and enters the soil to pupate. The puparia remain in the soil until the following May, some pupae remain for a second year. Larvae hatching in green fruit rapidly die, but thrive in mature fruit and tunnel toward the center. The tissue around the oviposition scar in infested fruit becomes soft and brownish.

Description: The adult is small, 3.5 to 4 mm. long; almost entirely black; head large, clear yellow anteriorly and dusky on lower face. Face not keeled. Frons little larger than one eye, seen from below. Ocelli triangle, brown; antennae colorless. Chaetae and bristles of head very short. Thorax black with exception of brilliant lateral line. In addition, anterior part of thorax with two brownish longitudinal bands and sides of shield with black spots. Abdomen black, ornamented by marginal hairs on last segments. Femora black, tibiae and tarsi yellow except posterior pair which darken toward middle. Wing with characteristic design. (See illustration of adults). Bands and markings of wings blackish. Males distinguished from females principally by elongation of fifth abdominal segment and absence of ovipositor. Mature larvae white, 2.5 mm. long. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 8(30) 7-25-58



Adults of Rhagoletis cerasi

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

LEMON BUTTERFLY (Papilio demoleus (L.))

Economic Importance: This papilionid is widely distributed from Africa to northern Australia and is sometimes a destructive pest of citrus in several areas, especially to young nursery plants. It also sometimes causes serious damage to older plants, stripping the leaves when larvae are numerous. Cultivated and wild citrus are considered the most important hosts, certain varieties being more readily attacked at different locations. Several subspecies of P. demoleus are known, P. d. demoleus and P. d. malayanus, being considered major pests in the Indian area.

Distribution: Range extends from Formosa and China to Iran, Arabia and the whole of Africa. Also occurs in the smaller Sunda Islands to northern Australia and southern New Guinea; absent from the Philippines, larger Sunda Islands, Celebes and the Moluccas.

Hosts: Larval feeding occurs on leaves of cultivated and wild citrus, baelfruit, Chinabox jasminorange, curryleaftree, Malaytea scurfpea, atalantia, Malay glycosmis and common jujube. In Ceylon, larvae prefer leaves of Ferronia elephantum.



General Distribution of Papilio demoleus

Life History and Habits: Eggs are laid on leaves, usually singly, but sometimes in groups of 2 or 3. Hatching occurs in 3 days, larval feeding beginning almost immediately. There are usually 5 larval instars, occasionally only 4 occur. Pupation takes place on the underside of a leaf or against a stalk or twig, the supporting loop of the chrysalis rather short. Occasionally larvae may migrate to other plants to pupate. The butterflies have a quick, strong flight, rising very little above the ground. They prefer the flowers of citrus and Raphanus. The total life-cycle varies from 20 to 100 days in summer. Hibernation takes place in the pupal stage, but year-around reproduction is not uncommon in milder climates. Larvae throw out a red Y-shaped process from behind the head and emit a characteristic odor when disturbed.

Description: Adults somewhat variable, depending on subspecies. Body, sides of head, lateral thoracic stripes pale yellow. Forewing above base dotted with pale yellow, dots uniting into transverse lines; large cell-patch, usually divided into 2 spots, at upper angle of cell 2 or 3 spots; a macular discal band, upper spots small and far apart, posterior ones large and usually contiguous; band on hindwing not interrupted; both wings with row of submarginal spots and small marginal lunules, hindwing with red anal spot, not tailed. Egg pale-yellow; about 1 mm. in diameter. Young larva blackish, large V-spot in middle; lateral stripe from prothorax backwards, second stripe from anal segment forwards, milky-white; several rows of setiferous processes. Mature larva yellow-green above, broad-greasy white lateral band from segment 5 to end. Greenish dorsal part of segments 2 to 5 bordered narrowly with curved black line which does not reach base of legs; abdomen and legs a dirty transparent white. Segments 8 and 9 with diagonal yellow-brown band reaching from center of 9 near dorsum to anterior margin of segment 8; similar patch at posterior lower margin of segment 10. Prolegs large and fleshy. Length 33 mm. width 7 mm. Pupal color variable. Length 30 mm.; width 10 mm. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies and the U. S. N. M.) CEIR 8(46) 11-14-58



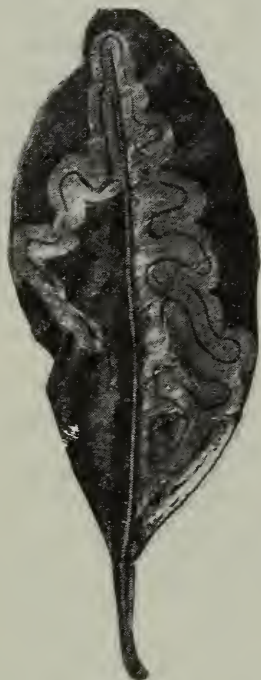
Adult of Papilio demoleus demoleus (L.)

Figure (except map) from Talbot, G. 1939. The Fauna of British India including Ceylon and Burma. Butterflies. Vol. 1, 589 pp. London.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

CITRUS LEAF MINER (Phyllocnistis citrella Stainton)

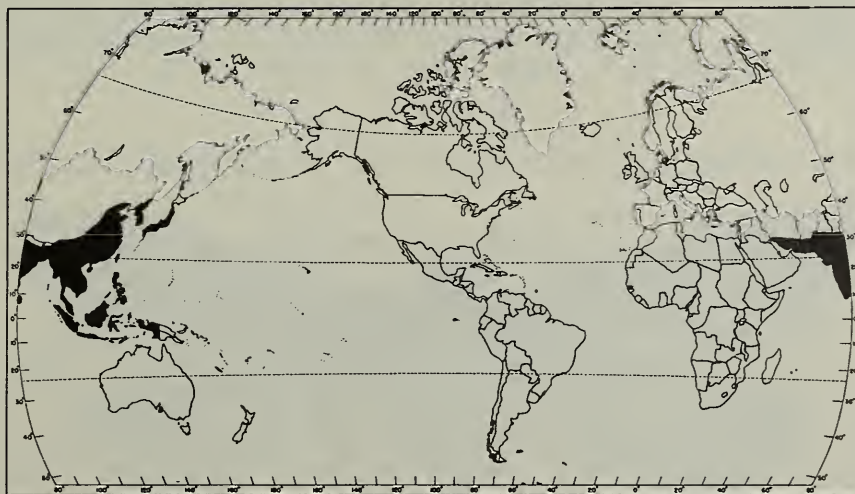
Economic Importance: Citrus plants are sometimes seriously hampered by attacks of Phyllocnistis citrella in citrus-growing areas of Asia, especially the young tender shoots and leaves of plantation plants and young nursery stock. Injury is caused by larval mining which results in the killing of large amounts of tissue. When the mines become excessive in number, growth of the plant stops, though an infestation seldom causes the death of the tree. The mines have been reported as points of citrus canker infection in some areas where the disease occurs.



Distribution: Occurs throughout tropical Asia; being recorded in Iran, India, Ceylon, East and West Pakistan, Burma, Thailand, Malaya, Indonesia, Indochina, China, Korea, Japan, Formosa, Netherlands New Guinea, Philippines, Loochoo Ids., Mariana Ids. and western Carolina Ids. Records in the literature from Cape Town, South Africa, and the Northern Territory of Australia seem of doubtful accuracy since subsequent confirmatory records have not been found.

Characteristic Mines in Leaf

Hosts: Citrus is the principal host. Also attacks baelfruit, curryleaftree and Arabian jasmine in India and kumquat in Japan.

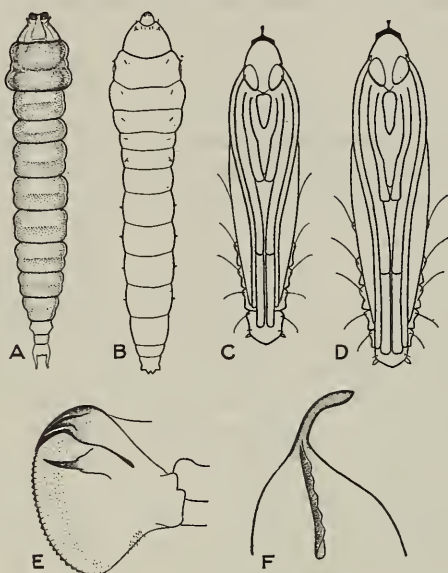


General Distribution of Citrus Leaf Miner

(Lyonetiidae, Lepidoptera)

Life History and Habits: The eggs are laid singly, 2 or 3 per leaf, on either surface but usually on the underside near the midrib. During the summer, hatching takes place in about 3 days. The young larvae enter the leaf tissue and feed as leaf miners without coming to the surface during their development which takes 5 or 6 days. Typical injury consists of irregularly twisted galleries containing a brownish excrement. The epidermis over the galleries appears as a silvery film. Most of the mines are found on the upper surface of the leaf in the more humid and tropical areas. When larval feeding ceases, the epidermis of the leaf and opposing tissues are forced apart by the rolling and arching action of the larva thus forming a pupal chamber. The portion of the

cocoon visible has a distinct orange cast. Emergence takes place in about 6 days, usually during the early morning hours. The adults are nocturnal and seldom seen. Populations are lowest from December to February and greatest from March to May and September to November in the Punjab of India. This species passes the winter solely as an adult. Approximately 6 generations a year are produced in southern Japan.



Larval and Pupal Forms of Phyllocnistis citrella - (A) Mature Larva, (B) Prepupa, (C) Male Pupa, (D) Female Pupa, (E) Mandible of Larva, (F) Pupal Head Prong

Description: The adults are very small, silvery-white with pale-yellow markings, and a black spot at the tip of each forewing. They are seldom noticed with the naked eye. Eggs are about 0.27 mm. in length, flat, and without sculpturing or covering. The mature larva is cylindrical, dull-yellow in color. The larval head is small. It has a pair of antennae terminating in two rounded lobes and rudimentary mouth parts with the exception of the spinnarets. The earlier larval stages are pale greenish-yellow and have modified mothparts for sap-feeding. The later larval stages

are similar in form, though the head and thoracic segments of the earlier stages are proportionately larger. The pupa is pale-yellow inside the cocoon, and has a stout curved prong on its head and heavy spines on the abdomen which are used in emergence. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies and the U. S. N. M.) CEIR 8(45) 11-7-58



Adult Female of Phyllocnistis citrella (Enlarged 25 times)

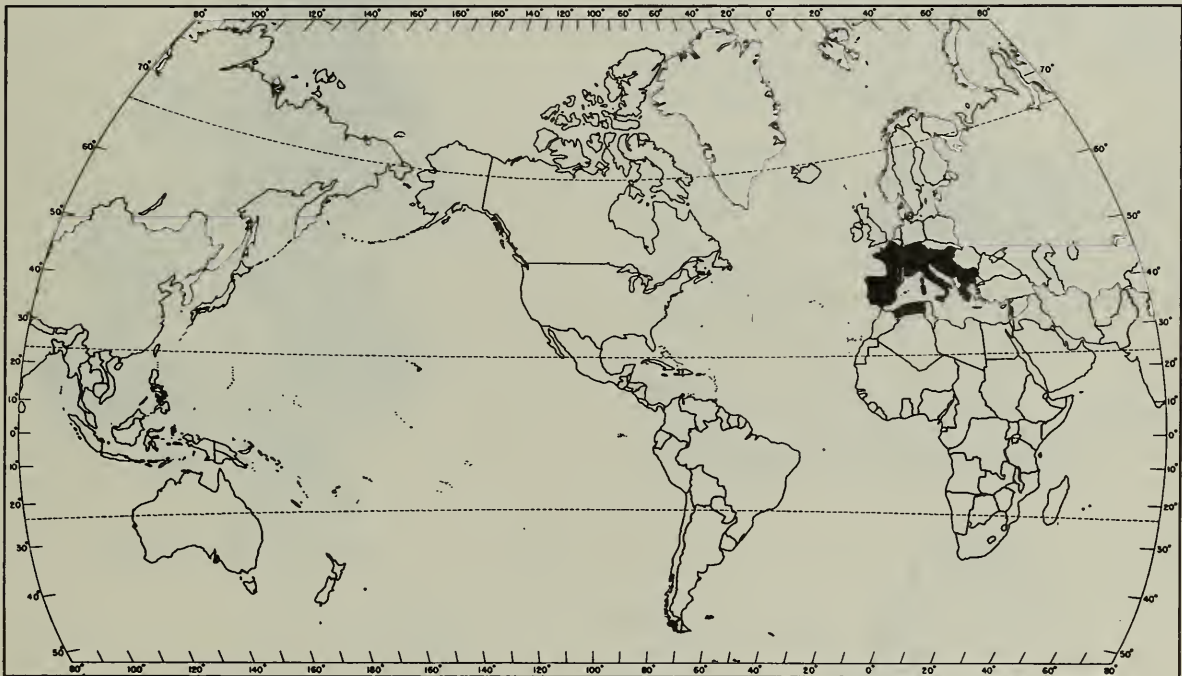
INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

CHESTNUT WEEVIL (Curculio elephas (Gyllenhal))

Economic Importance: This curculio is one of the most serious pests of chestnuts in Europe. The larvae feed in the nuts, often completely destroying them. Additional injury is caused by the adults which puncture the base of the young nuts to feed, causing a premature nut fall as high as 20 percent of the crop in some instances. In Bulgaria it sometimes damages 70 percent of the crop. Larvae of this pest have been intercepted frequently at U. S. ports of entry in past years in chestnuts from Europe.

Distribution: Recorded in Italy, France, Austria, Germany, Greece, Bulgaria, Algeria, Spain, Lebanon, Yugoslavia, Portugal, Hungary and Switzerland.

Hosts: Chestnuts and acorns.

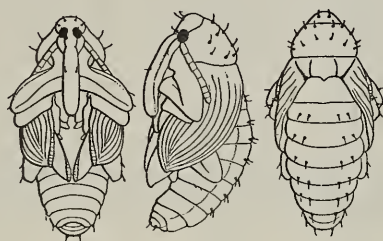


General Distribution of Curculio elephas (Gyllenhal)

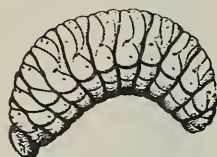
Life History and Habits: The adults are present from mid-July till October in France. The eggs are deposited singly in little holes made in the fruit. Each female will lay approximately 20 eggs. Larvae enter the cotyledons, their entrance holes rapidly becoming invisible. The presence of larvae in chestnuts is very difficult to detect. Larvae leave chestnuts in about 40 days after the eggs are laid, and enter the soil, where they pass the winter, and pupate about mid-June. Occasionally pupation and adult emergence occur in the nuts. Infested fruits usually fall prematurely and are often attacked by fungi.

(Curculionidae, Coleoptera)

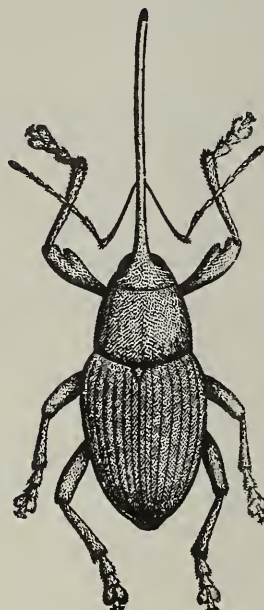
Description: The rostrum of the female is as long as the body and twice as long as that of the male. The tarsus is long and slender and the dorsal side is uniformly composed of lanceolate yellowish or grayish scales. Antenna is very long and thin and covered with pubescence. The eyes are large. The general color of the weevil is russet with an ashen overcast from a dense pubescence. Length 6-9 mm. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies and the U. S. N. M.) CEIR 8 (50) 12-12-58



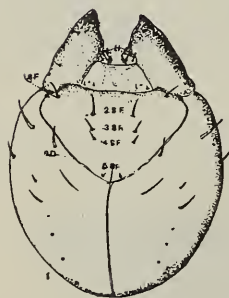
A



B



C



D



E

Figures of Curculio elephas (Gyll.) : A-pupa; B-mature larva; C-adult; D-head of mature larva; E-lateral-half of metathorax, mature larva.

Figures (except map): Adult, larva and pupa from Colizza, C. 1928-1929. Bol. del Lab. di Zool. Generale e Agraria 22:244-262. Larval head and lateral-half of metathorax from La Ferla, A. 1945. Bol. R. Lab. Ent. Agrar. Portici 5:308-311.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

CELERY FLY (Acidia heraclei L.)

Economic Importance: This tephritid is a well-known pest in the British Isles and on the European Continent. The Larvae mine the leaves of celery and parsnip, frequently causing great reduction in the value of the crop. In severe attacks, from 90 to 100 percent of the leaves in a bed of celery may be infested. In such cases, The crop is entirely worthless. The larvae live between the epidermal layers of the leaf, making blister-like patches, which at first are pale but later turn brown. The infested leaf contracts and after a short period shrivels up. The loss of leaves produces small, green, bitter flavored celery. Parsnip foliage is infested in the same manner and when badly attacked, the roots of the plant are small. The pest has been erroneously recorded in the United States.



Damage to Celery

Distribution: Occurs generally in Europe, with records in England, Wales, Cyprus, Czechoslovakia, Denmark, France, Finland, Italy, Germany, Norway, Sweden, Switzerland and USSR; has also been recorded in the literature from Morocco, North Africa and Asia Minor.

Hosts: Celery and parsnip are the chief cultivated hosts. Various species of Heracleum and Angelica are the most important wild host plants.

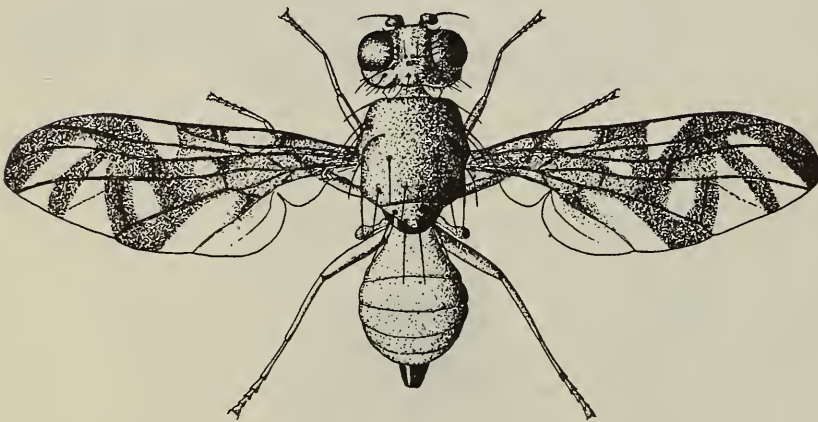


General Distribution of Celery Fly

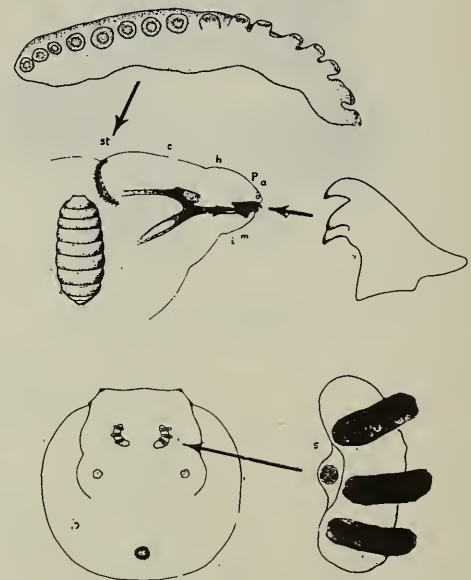
(Tephritidae, Dipera)

Life History and Habits: In England, there are two main generations a year, with a possible third, but there is considerable overlapping between broods, therefore adults, larvae and pupae may occur simultaneously. The first adults usually appear from April to early June and the second brood from July onwards. The adults emerge from overwintering puparia in the soil. Eggs are usually deposited singly on the undersurface of the leaf, but sometimes on the upper surface, and hatch in 6 to 14 days. Females deposit up to 100 eggs each. The larva matures in 14 to 19 days within the leaf surface, and pupates either within the leaf or falls and pupates in the soil. In the summer, flies emerge from puparia in 3 to 4 weeks, however, the second-brood maggots may remain in puparia until the next spring. The young larvae live gregariously and may occupy a considerable area in the leaf. Larvae may occasionally be found as late as December in England.

Description: The adult male is variable in color, ranging from light brown to black. Eyes deep green, sometimes tinged with red, widely separated in both sexes. Antennae pale yellow, third segment much larger than second. Head bears number of long bristles. Thorax black or dark brown, shiny, scutellum bears four long bristles which may be pale yellow or black. Abdomen elliptical, rather shining in male, slightly broader than thorax. Female abdomen broader and somewhat pyriform; ovipositor conical and hard. Wings broad, banded with brown wave-like markings, with hyaline areas between the bands. Halteres yellowish. Length of adult, 5mm. The egg is white, elongate oval, 0.5mm. in length. Larva is white, somewhat glistening with greenish tinge. There are 11 segments posterior to the cephalic segment. The anterior spiracles usually with about 18 small lobes. Mandibular sclerite with three distinct hooks, posterior sclerite thin and widely forked. The posterior spiracles each with three lozenge-shaped slits. Length 7mm. Puparium oval, light yellow with wrinkled appearance, length 5mm. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 8(19) 5-9-58



Female of Acidia heraclei



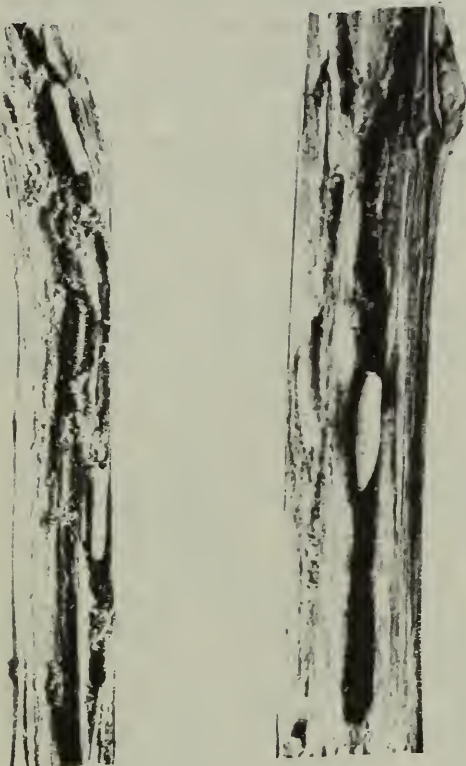
Larvae and Pupae (showing mandible on the cephalo-pharyngeal skeleton, caudal and prothoracic spiracles)

Figures (except map) from Lundblad, O. and Lindblom, A. 1925. Meddelande No. 283 fran Centralanstalten for forsöksvasendet pa jordbruksomradet. Entomologiska advelnigen No. 45. 25 pp. Sweden.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

ASPARAGUS FLY (Platyparea poeciloptera Schrank)

Economic Importance: This tephritid is considered to be one of the three most important pests of asparagus in France. Asparagus fly is generally considered to occur wherever asparagus is grown in Europe, but environmental conditions in certain areas may prevent buildups of populations. Damage is most severe in young asparagus, two-year-old plantings suffering most. The larvae mine the stems, causing distortion or death of early shoots and later attack the plants that are left to develop. Asparagus beds that are left uncontrolled in England become unproductive. Infested older asparagus stems may be recognized in late summer by premature yellowing. This species has been erroneously reported as occurring in the Western Hemisphere.



Stalk Damage

Distribution: Occurs generally throughout the central and southern parts of Europe, having been recorded in Austria, France, England, Netherlands, Germany, Hungary, Poland, Italy, Czechoslovakia, Sweden and USSR (Kiev Oblast).

Hosts: Asparagus is the only known cultivated host.



General Distribution of Asparagus Fly

Life History and Habits: Adult emergence from overwintering puparia begins in April on the European Continent. The eggs are deposited singly, about one inch from the asparagus tip, 0.5 to 1 mm. deep in the scales. Hatching occurs in a few days and the larvae begin to tunnel down the stems feeding on the tissues. One shoot may contain upwards of 20 larvae and pupae. The galleries of the larvae occasionally go to the roots but never penetrate them. Impeded and distorted growth of the stem indicates the presence of the insect. Just before pupation, the larva ascends the stem without making a new gallery to just above the soil level then excavates a passage to the surface without breaking the epidermis. The adult will emerge at this point. Larvae mature in 3 to 4 weeks and then pupate, head upwards, about 2 to 5 inches below the surface of the soil, though sometimes they will pupate above the surface. There is only one generation a year, but due to the lengthy period of emergence, newly-hatched larvae and pupae may be found at the same time, even in the same stem. Asparagus beds that are surrounded by high vegetation are sometimes protected from attack, since the females prefer to lay eggs in clean-cultivated asparagus.

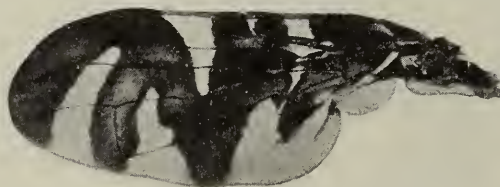
Description: The adult is similar in appearance to the celery fly, *Acidia heraclei*, but is slightly larger, and the black markings on the wings are more extensive. The body is almost entirely gray; head yellow, face ferruginous, palps testaceous, antennae brownish, frons chocolate-brown, eyes red. Thorax clear gray with three long, black longitudinal stripes; shoulders yellowish. Wings are characteristic (see illustration). Abdomen black. Adult 5-7 mm. long. Eggs white and oval, 1.3 mm. long. Mature larva 7-9 mm. long, yellowish-white in color, front segments slightly tapered with two hooks; posterior end flattened with brown plate surrounding two posterior, forked processes. Pupa 7-8 mm. long, slightly flattened on one side, short anchor-like process at posterior end. Color light brown at first, later becoming darker. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 8(38) 9-19-58



Male



Female



Wing

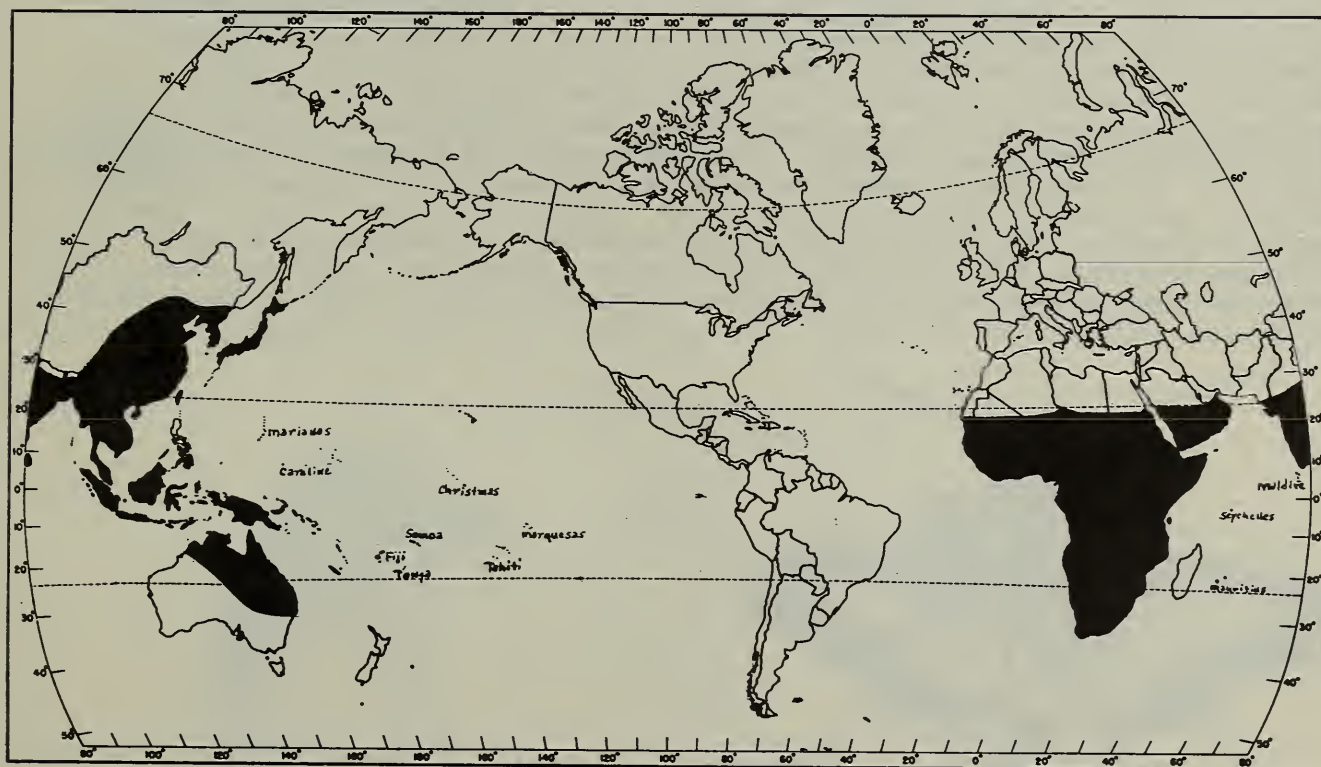
INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

PUMPKIN CATERPILLAR (*Diaphania indica* (Saunders))

Economic Importance: Generally this pyraustid is a pest of cucurbitaceous plants wherever it occurs. The pumpkin caterpillar is considered one of the more important pests of cucurbits in the Indian Region and has been reported as destroying cucumber fields in New South Wales, Australia. Damage to fruits of host plants is most prominent during August and September in India, though larvae may cause considerable leaf damage to hosts earlier in the season. Leaf injury was prevalent on watermelons in Queensland, Australia, in 1946. Leaf feeding on cotton is sometimes a problem in Japan and Africa.

Distribution: Widespread through Central and Southern Africa, Southern and Eastern Asia, Australia and many of the Indian and Pacific Ocean islands. including Mauritius, Seychelles, Carolines, Christmas, Fiji, Maldives, Marianas, Marquesas, Samoa, Tahiti, Tonga and Mindanao in the Philippines.

Hosts: Cultivated cucurbits are the most important hosts. Also feeds on wild cucurbits, beets, cotton, soybeans, eggplant, hibiscus, hollyhock and Arabian jasmine.

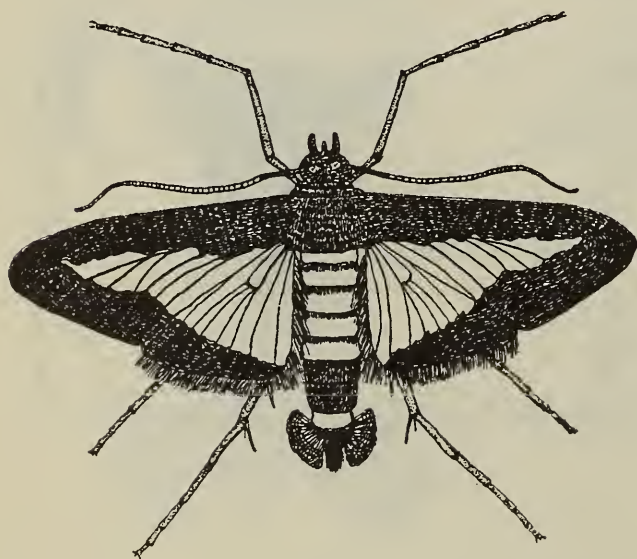


General Distribution of Pumpkin Caterpillar

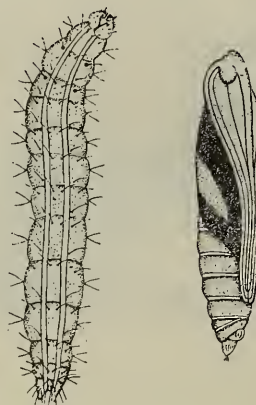
(Pyraustidae, Lepidoptera)

Life History and Habits: The eggs are generally laid singly on the under-surface of the leaves, hatching in 3-6 days. Young larvae move about for some time, then fold the leaf or two adjacent leaves and begin feeding on the epidermis while in the fold. Damaged patches dry out and result in distortion. Larvae may also attack the young developing fruit or more advanced fruits except those that have a hard, resistant rind. The larvae pass through 4 or 5 instars in 9 to 14 days. Pupation takes place in a cocoon within the leaf-fold and lasts from 5 to 13 days, depending on the temperature. The adult life ranges from 3 to 7 days at a mean temperature of 81°F., and the oviposition period is about two days, each female laying about 159 eggs. In tropical regions, *D. indica* will probably breed throughout the year, but in Japan only 3 broods are produced annually. The insect hibernates as a partially developed larva in Japan.

Description: Wing expanse of the adult about 24 mm. length of body about 12 mm. Costal margin of the forewing banded dusky-drab; band continuous with the head and first two thoracic segments. Band also extends humeral margin of the forewing and the hindwing and is continuous on the 5th and 6th abdominal tergites. The rest of the wing is white with purple luster. A globular tuft of scales is present at the posterior end of the abdomen, in male the scales in the middle of the tuft are light colored and the entire appearance is orange. The eggs are oval, barium yellow in color, and average about 0.80 mm. Mature larva 18.5 mm., greenish with pair of longitudinal white stripes that are more or less parallel from the prothoracic region to the last abdominal segment. In some stages of larval development the white stripes may not be distinct. The head with 6 pair of ocelli, one pair posterior to the base of each respective antenna, remaining 5 pair still posterior in a semi-circle. Antennae 3-segmented. Segment 2 about $2\frac{1}{2}$ times longer than segment 1. Two small sensillae and 2 setae on tips of segment 2. Length of one seta about twice length of antenna. Segment 3 smallest antennal segment, with 3 apical sensillae. The mesothoracic and metathoracic tergites have a pair of black specks at the base of the subdorsal setae. Each body segment with 6 dorsal setae and 2 pairs of lateral setae, side by side. All setae arise from tubercles and form definite longitudinal rows. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.). CEIR 8(39) 9-26-58



Adult



Larva and Pupa

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

CABBAGE MOTH (Mamestra brassicae (L.))

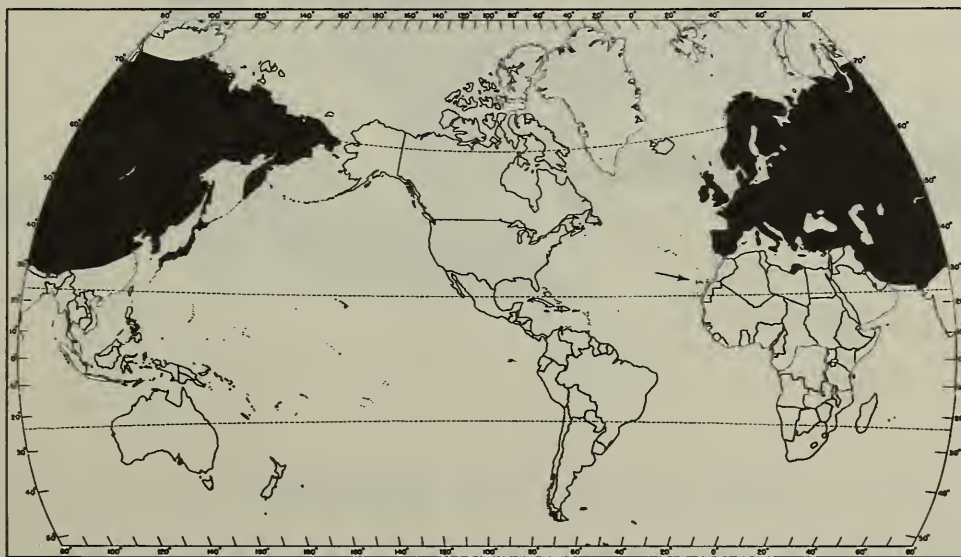
Economic Importance: The larvae of the cabbage moth are very destructive to vegetables, particularly cabbage and other crucifers, and ornamental flowers in Europe and Asia. Though injury is of less general importance, sugar beets, tobacco and hemp are sometimes heavily damaged. In the U.S.S.R., Mamestra brassicae is considered to be more injurious to cabbage than Pieris brassicae because the larvae bore into the heart of the plant to a greater extent. However, when populations are extremely numerous, whole plants may be destroyed. In Bulgaria the annual loss of cabbage attributed to this pest has been estimated at from 20 to 30 percent, with up to 80 percent loss in some badly infested localities. Larval counts have averaged up to 50 per plant in severe infestations in that country. M. brassicae has been taken with increasing frequency since 1945 at U. S. ports of entry, principally at Atlantic Coast ports.



Damage to Dahlia

Distribution: Occurs generally throughout Europe; also recorded in Libya, Turkey, Iran, Kashmir, West Pakistan, India (Punjab), China (Tibet and Northern China), Korea, Japan, Asiatic part of U.S.S.R. and the Canary Islands.

Hosts: This is a general feeder and will live upon many kinds of plants, both cultivated and wild. Crucifers probably suffer most, but tomatoes, tobacco, lettuce, onions, corn, hemp, soybeans, peas, vetch, flax and several ornamentals including calendula, gladiolus, geranium and lupine are quite often attacked.

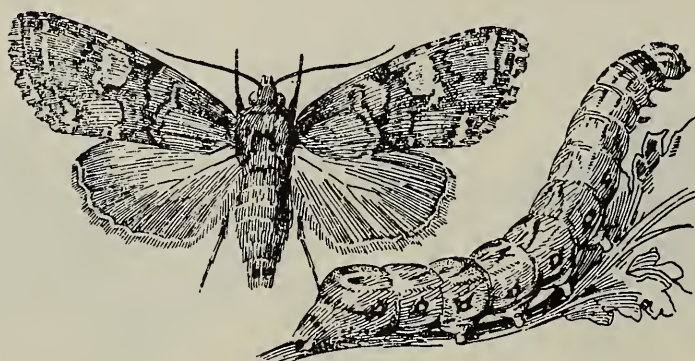


General Distribution of Cabbage Moth

(Noctuidae, Lepidoptera)

Life History and Habits: The life history of Mamestra brassicae as recorded in Bulgaria is as follows: The female deposits its eggs in 6 to 28 clusters, 15 to 188 per cluster. Females may deposit from 438 to several hundred eggs, generally on the underside of the leaf. Eggs hatch in 6 to 9 days. The larvae pass through 5 molts in 25 to 30 days, feeding on the leaves of the host plants or in some instances into the heads and stalks. Pupation takes place in the soil, 5 to 6 cm. deep. The pupal period during the summer averages about 27 days before emergence of the new generation. Hibernation takes place in the pupal stage. In Bulgaria two generations a year are normal, sometimes a partial third generation develops, while in Scotland one generation is usual with a partial second generation sometimes being produced. Characteristic damage to disc-shaped flowers involves feeding on the outer circumference at first and then uniformly, all around, gradually working inwards until nothing is left but the central disc of flowers.

Description: The adult wing expanse is about 44 mm. Forewing dark brown irrorated with gray; many blackish streaks and marks present. Subterminal line not defined by whitish on inner side. This character separates M. brassicae from M. configurata, a North American species which has subterminal line prominently defined by whitish on inner side. Orbicular spot is distinctly defined by black. Hindwing brown, pale at base with whitish fringe. Thorax color same as forewings. Abdomen brown with more or less distinct tufts down back, tip of abdomen distinctly tufted. Legs brown and very hairy at base. Fore tibia with long terminal claw. This character separates M. brassicae from the species of closely related genus Polia. Larvae vary greatly in color when mature, but always green when young. Mature larvae are about 30 mm. long and have three light lines with slanting black marks in each segment. Head is ochreous and horny, first segment blackish. Legs and prolegs green, spiracles pure white. Body surface smooth with few hairs. Pupa shining chestnut-brown, with occasional darker areas. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 8(41)10-10-58



Adult and Larva of M. brassicae

Figures (except map): Adult and larva from Lengerken, H. von. 1932. Das Schadlingsbuch. 194 pp. Berlin. Damage from Cameron, A. E. 1939. Insect and other pests of 1938. Highland and Agr. Soc. of Scotland, Trans. Ser. 5, 51:136-174.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

LARGE WHITE BUTTERFLY (Pieris brassicae (L.))

Economic Importance: Sporadic outbreaks of this pest occur throughout most of Europe. Such infestations cause serious losses to crucifers in Europe and Asia, and on occasions complete loss of the crop has been reported. The populations were so heavy in 1927 in Poland that control measures were not effective in preventing destruction of most of the food plants. Many host plants have been occasionally attacked. In Turkestan, USSR, during 1913, 90 percent of the cotton crop was destroyed in some areas. Generally the late broods are the most serious and are largely migrant. Serious populations have resulted in England from butterfly flights from the Continent, and large migrations have been observed in Switzerland passing over the Jura Mountains and the Alps southward.



Larval Damage

Distribution: Occurs throughout Europe, North Africa and the Middle East generally and range extends through northern India and southern Siberia to Tibet and China.

Hosts: Feeds on many crucifers, garden and ornamental plants; but generally seems to prefer crucifers.



General Distribution of Pieris brassicae

(Pieridae, Lepidoptera)

Life History and Habits: Adults emerge from the overwintering pupae in April or May. Eggs are laid in clusters, but sometimes singly, on the under surface of leaves, each cluster consists of 4 to 100 eggs. Eggs hatch in 5 to 8 days and larvae feed through five instars. The total period from egg to mature larva varies from 4 to 6 weeks. The chrysalis is attached to plants, sticks, stones, and especially to walls and fences. In England, there are generally two broods a year, the first laying eggs in May and the second in July and August. In USSR, however, three broods are reported, and sometimes a partial fourth brood is produced, though this is unusual. Normally the latter broods are heavily attacked by parasites.

Description: The adults of Pieris brassicae and P. rapae are similar in general coloration and markings, but P. brassicae is the larger of the two species, having a wing expanse of 60 mm. compared to 50 mm. in P. rapae. The markings on the wings of P. brassicae are as follows: Female forewing with blotch of black at tip, round spot near center of wing, another spot nearer the inner margin, and a tapering spot on the inner margin of its point toward the base of the wing. One spot on hindwing, situated near middle of coastal margin. No markings on forewing of male, with exception of those at tips. The larvae of P. brassicae and P. rapae more readily distinguishable; ground color of P. brassicae blue-green, spotted with black and P. rapae an intense leaf green, also spotted with black. In P. brassicae, a narrow, yellow median dorsal stripe is present, with two similar, but wider, stripes present on the sides. The median dorsal stripe in the larva of P. rapae, orange, with a broken yellow stripe on each side. Surface of body in both species covered with small, warty projections, each containing a hair. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 8(28) 7-11-58



Larva



Male



Female

Figures (except map): All stages from Rostrup, S. and Thomsen, M. 1931. Die Tierischen Schädlinge des Ackerbaues. 367pp., Berlin. Larval damage from Balachowsky, A. and Mesnil, L. 1936. Les Insectes Nuisibles aux Plantes Cultivées. Vol. 2, pp. 1141-1921. Paris.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

TURNIP FLEA BEETLE (Phyllotreta nemorum (L.))

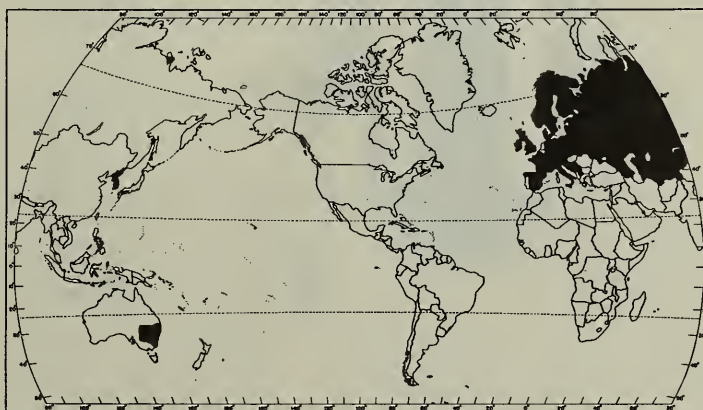
Economic Importance: Turnip flea beetle adults are serious pests of cruciferous crops in many areas of Europe, particularly on seedlings in the spring. Infestations often destroy the crop. In USSR from 1913 to 1915, 75 percent of the cabbage plants were destroyed in some areas. In addition to leaf feeding, the yellow mosaic virus of turnips has been transmitted by adults of Phyllotreta spp., including P. nemorum. Larval infestations of P. nemorum are also of importance in localized areas, but peak of feeding varies in Europe depending on climatic conditions. Both larvae and adults have been intercepted at U. S. ports of entry on several occasions from Europe. The beetle was introduced into New South Wales, Australia, prior to 1939, but as yet is not considered to be an important pest there.



Damage to Radish Leaf

Distribution: Occurs throughout most of Europe, Asiatic USSR (Western Siberia), Korea and Australia.

Hosts: Prefers crucifers generally, especially turnips in some areas, but has been recorded on peas, vetch, beets, soybeans, hops, flax, rhubarb and nasturtiums.



General Distribution of Turnip Flea Beetle

(Chrysomelidae, Coleoptera)

Life History and Habits: The overwintering adult emerges from winter quarters in early spring, usually about middle of April in England, and begin to deposit eggs singly, or in groups of 2-4 on the soil and sometimes on the epidermis of cruciferous hosts. The larvae hatch in 8 to 10 days and tunnel into the mesophyll tissue of the leaf. The mine is marked by a black excremental line. There may be as many as 107 larvae per leaf. The larvae mature on cabbage in 13 to 17 days and enter the soil to pupate. Pupation lasts for about 14 days. The life cycle requires 5 to 6 weeks. In England there is only one generation a year, but in USSR there may be from one to six, depending on the climate. In the fall, the adults enter hibernation in a variety of places such as under bark or dead leaves, in hedgerows, and often in farm buildings. Feeding in the early spring usually takes place on wild crucifers, and when the leaves of these hosts turn coarse, they turn to cultivated cruciferae. They return to the wild hosts in August after the cultivated hosts become coarse. The winter is passed in the vicinity of the wild hosts.

Description: Adult is oval, somewhat flattened. Length 2.5 to 3.5 mm. Antennae are long, dark, the first three joints paler, succeeding ones dark piceous. Thorax is broad, rounded, closely punctured. Elytra have two broad yellow bands which are slightly waved. Tibiae are reddish-yellow. The fourth and fifth antennal segments of the male are slightly or noticeably or perceptibly swollen. Eggs are yellow, rounded and finely pitted. The mature larva is about 6 mm. long, yellowish with series of blackish chitin plates. The pupae are at first yellow but change to black, just prior to emergence. The change beginning with a red tinge of the eyes on about the sixth day. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.). CEIR 8(27) 7-4-58



Adult and Larva of Phyllotreta nemorum

Figures (except map): Adult and larva from Garcia-Tejero, F. D. 1946. Bol. de Patol. Vegetal y Ent. Agr. 15:353-368. Larval damage from Rostrup, S. and Thomsen, M. 1931. Die Tierischen Schadlinge des Ackerbaues. 367 pp. Berlin.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

CABBAGE-STEM FLEA BEETLE (Psylliodes chrysocephala (L.))

Economic Importance: Larvae of this chrysomelid are very injurious to cruciferous plants in several areas of Europe, particularly to turnips, rape, cauliflower and cabbage. They were responsible for the complete destruction of terminals of overwintered crops in the spring of 1944, 1945 and 1946 in Switzerland. The insect is a serious pest of turnips and rape in Germany and partly responsible for the decline of rape cultivation in Holland. The adults are not considered injurious in England, but sometimes completely destroy fields of winter rape and sugar beets in Germany. This pest was first found in North America during 1952 near St. Johns, Newfoundland, but has not been reported since that date. Larvae of P. chrysocephala are frequently intercepted at U. S. ports of entry.

Hosts: Cultivated and wild crucifers are principal hosts. Also attacks sugar beet, flax, vetch, soybeans and Mathiola incana.



General Distribution of Psylliodes chrysocephala

Distribution: Occurs throughout Europe and in Newfoundland, Canada. Interceptions have been reported from North African sources which indicate this species is probably present in that area also.

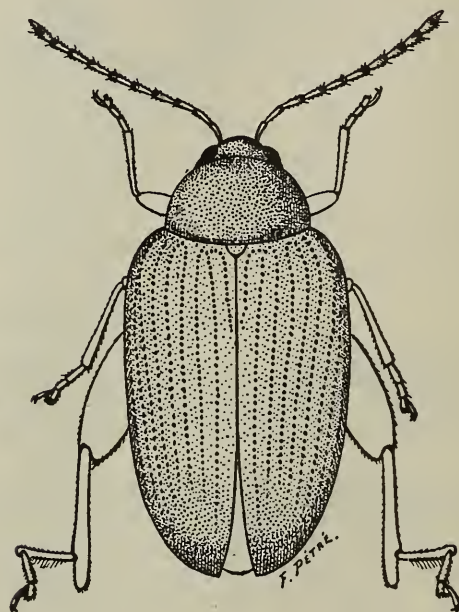
Life History and Habits: Overwintering adults become active during the early spring in England, later in some other countries. Females deposit over 1,000 eggs, 400 to 500 of which are laid after overwintering. Larvae arising from eggs deposited by overwintering adults pupate in April or May in England and give rise to the second brood which passes the winter. Hibernation may occur either in the egg or larval stages. Damage in England is largely confined to larval tunnelling in the stems and midribs of cauliflowers; occasionally the stalks are hollowed out, appearing blackish. In Germany, young first-instar larvae usually enter the leaf-stalk from the upper surface. Second and third-instar larvae enter any side. The mines are tortuous, consisting of a central tunnel along the stem with one or more branches at right-angles. Molting occurs close



Larvae of P. chrysocephala
in Midrib of Cauliflower Leaf



Leg of P. chrysocephala



Adult of P. chrysocephala

to the exit holes near the walls of the stalk. Larvae may leave one stalk and enter another in search for fresh food, leaving characteristic trails on the surface of the plants. Pupation normally occurs in the soil, but may take place in the stalk. Winter is the most important factor in limiting the population.

Description: The adult shape is oval, rather long and metallic greenish-blue. Head reddish; antennae long, lighter at base, 10-jointed. Thorax rounded, rather broad, very finely punctate; elytra with regular rows of fine punctures. Legs yellowish-brown to red with posterior femora and tibiae darker. Length 3-5 mm. Larva creamy white; head, pronotal shield and ninth abdominal tergite brown, abdomen with three transverse dorsal row of hairs; length 8 mm. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 8(44) 10-31-58

Figures (except map): Adult from Balachowsky, A. and Mesnil, L. 1936. Les Insectes Nuisibles aux Plantes Cultivees. Vol. 2, pp. 1141-1921. Paris. Leg from Jablonowski, J. 1906. A Czukorrepa Allati Ellensegei. 288 pp. Budapest. Larval damage from Smith, K. M. 1948. A Textbook of Agricultural Entomology. 289 pp. Cambridge.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

PEA THRIPS (Kakothrips pisivorus Westwood)

Economic Importance: Pea thrips frequently causes extensive losses of peas and beans throughout Europe. In Sweden it is considered one of the most important pests of beans. It was first observed in that country in 1899 and in 1912 caused such serious damage that some of the crops were reduced to one-third and even to one-quarter of the normal yield. During the following years the losses involved were estimated at about 50 percent. Crop losses in late peas may be as much as 50 to 60 percent in northern Germany and complete loss of crop has been known in some districts of England. The flowers, pods and terminal shoots of host plants suffer most from attack. The pods are undersized and unhealthy, presenting a characteristic silvery appearance. Occasionally the flower itself is injured so severely that further development is unlikely.



Damage to Peas by Pea Thrips

Distribution: Occurs throughout Europe including the Caucasus in USSR.



General Distribution of Pea Thrips

* Also called bean thrips, "Blackfly" (Thripidae, Thysanoptera)

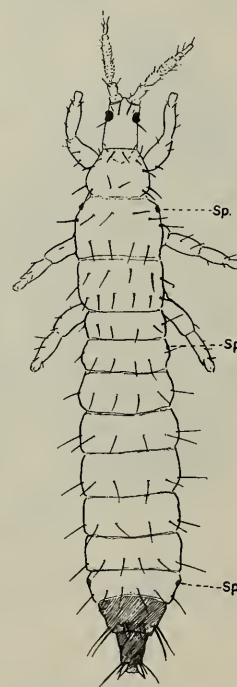
Hosts: Known to feed on many wild and cultivated hosts, but prefers legumes, especially beans and peas.

Life History and Habits: The adults appear in June and oviposit until late July with the eggs usually being laid in the stamen-sheaths of the hosts. The eggs hatch in about a week. The nymphs feed for about two weeks, passing through two instars, then enter the soil for hibernation at depths of 2-16 inches. In Switzerland up to 375 nymphs per square yard were found at depth of 16 inches with none being observed in meadow-land adjoining the pea fields. The nymphs hibernate for about 10 months, passing through 2 additional instars. After transformation, the adults rest for 2 days before emerging from the soil and then enter a preoviposition period that lasts from 7 to 13 days. The females lay an average of 17 eggs at the rate of 1 to 4 per day.

Description: Egg very small and bean-shaped. Second-instar nymph 1.8 mm. long, yellow to orange-yellow in color, apex of 9th and entire 10th abdominal segments brown. Posterior dorsal margin of 9th abdominal segment with comb of fine triangular spines, 9th and 10th segments each with pair of heavy spinelike postero-dorsal setae. Adult female 1.85 mm. in length, dark brown. Forewings heavily tinged with brown, lighter at base, hindwings almost transparent. Ocelli present, forming an equilateral triangle. A pair of long setae between posterior ocelli, another long seta behind each eye. Antennae 8-segmented; 3rd and 4th segments paler ventrally, 3rd with dorsal, 4th with ventral forked sense cone. Prothorax wider than long and longer and wider than head with two pairs of long setae on anterior margin, two pairs at each posterior angle and a smaller median posterior pair. Legs normal, all tarsi yellow, fore tibiae brown. Costa and both longitudinal veins of wing with complete row of setae. Posterior margin of eighth tergite with comb of fine setae. The adult male about one-sixth smaller than female, antennae much paler than in female. On each side of eighth abdominal segment is a short, curved, blunt-pointed process extending posteriorly. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 8 (7) 2-14-58



Adult Female



Second Stage Nymph

Figures (except map): Nymph and adult from Williams, C. B. 1915. Ann. Appl. Biol. 1(3/4):222-246. Damage from Buhl, C. 1937. Ztschr. f. Angew. Ent. 23(1):65-113.

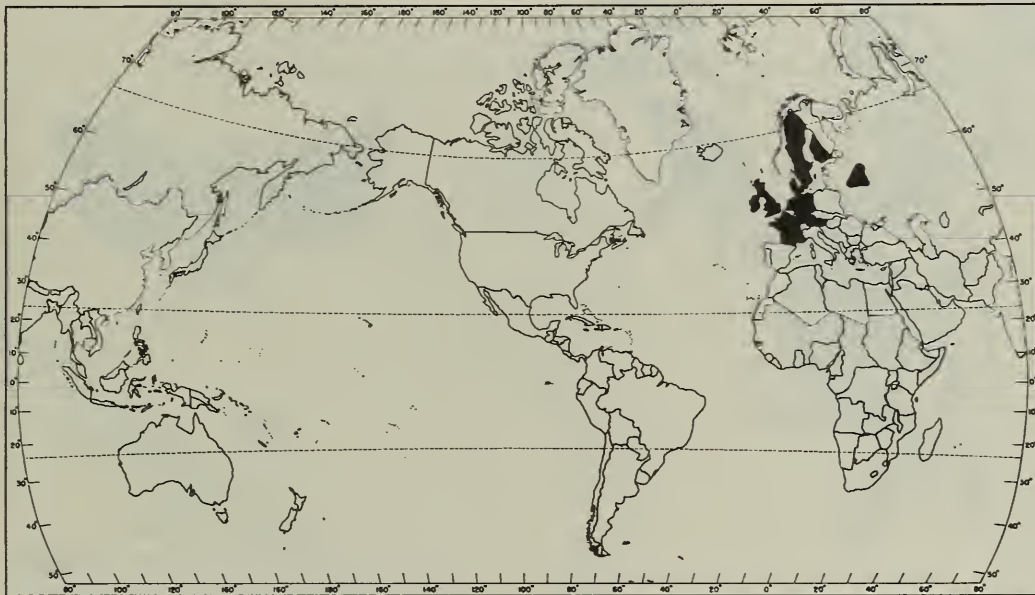
INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

RASPBERRY MOTH (Incurvaria rubiella (Bjerkander))

Economic Importance: This bud borer is a major pest of raspberry in Scotland, England, Ireland and Holland. From 50 percent damage to total loss of crop has been recorded in parts of England on raspberries and loganberries. Severe damage also occurs in Holland where 50 percent loss on raspberries is common during outbreaks. The pest was first reported in North America from Fredrickton, New Brunswick, Canada, in 1936. Surveys in that country in 1939 showed the insect was distributed at points in the St. John River Valley for a distance of 70 miles and that it also occurred on Prince Edward Island.

Hosts: Raspberry, blackberry and loganberry.

Distribution: Canada (New Brunswick, Prince Edward Island), Russia (Moscow), British Isles, France, Germany, Holland, Denmark, Austria, Ireland, Sweden and Finland.



General Distribution of Raspberry Moth

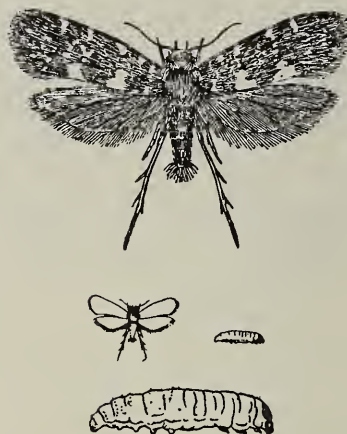
Life History and Habits: In Canada overwintered larvae appeared on canes in late April or early May. A larva may attack several buds before boring into one. Infested shoots, commonly those toward tops of canes, wither and die. Pupation occurs in early June near the tip of the bud. Adults emerge the last half of June and lay eggs on the flowers. Young larvae feed on the receptacles and young fruit, but cause little damage, then drop to the ground (after reaching the second instar in Scotland) and hibernate in debris or the soil.

Description: Adult wing expanse 6-10 mm. Wings dark purplish brown with satin sheen and conspicuous yellow spots. Young larva whitish. Cocoon-like structure in which hibernation occurs is about 2.5 mm. in diameter. Overwintered larva bright pink with blackish head and plate of first segment. Pupa brown.

(Prepared in Plant Pest Survey Section in cooperation with other ARS agencies, and the U. S. National Museum.)
CEIR 8(18) 5-2-58



Raspberry Shoots



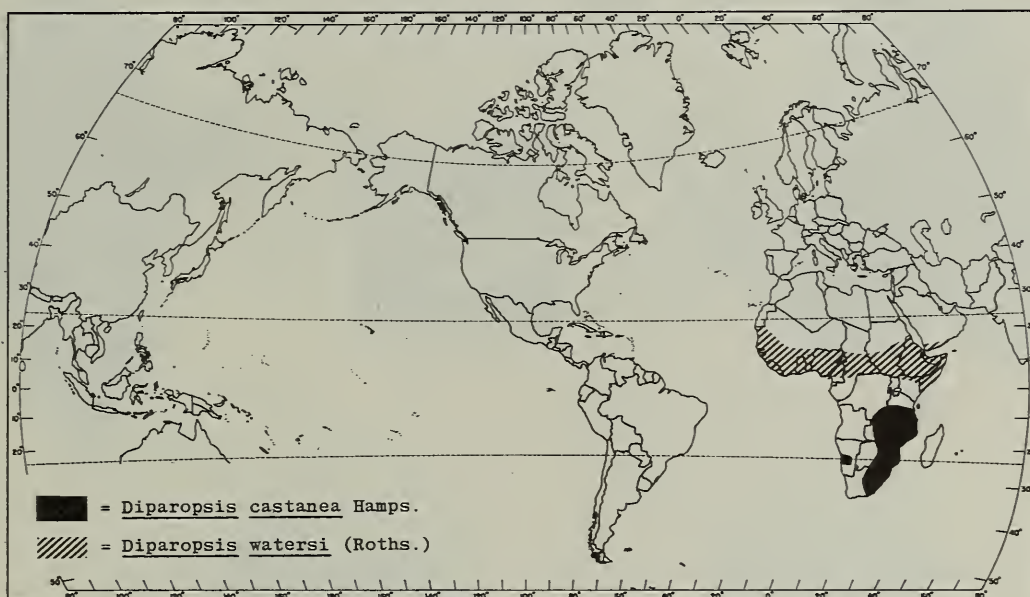
Adult and Larva of
Incurvaria rubiella

Figures (except map) from Ministry of Agriculture and Fisheries. 1931.
The raspberry moth. Advisory Leaf. No. 66, 4 pp. London.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

RED BOLLWORM (Diparopsis castanea Hampson)

Economic Importance: Losses caused by this pest to cotton are serious in some areas of South Africa. During outbreak years, losses have been as much as 80 percent in Nyasaland and Mozambique and 60 percent in the Union of South Africa. Damage has been so serious in some localities of Nyasaland that no cotton was picked from the first crop. The loss in yield of cotton attributed to the red bollworm was about 20 percent in the 1930-31 season in South Africa compared to an overall loss of about 33.7 percent that could be attributed to all species of bollworms. Generally speaking, red bollworm affects the cotton crop in three ways: (1) destroys full-sized bolls, (2) limits formation of mature bolls and (3) causes shifting of the time of crop production through destruction of first-crop cotton. Four species of Diparopsis are known to occur in Africa, the most important are D. castanea and D. watersi. The latter species is restricted to areas of Africa north of the equator and in Aden on the Arabian Peninsula. D. tephragamma is restricted to Angola and D. gossypioides to Tanganyika.



General Distribution of Diparopsis spp.

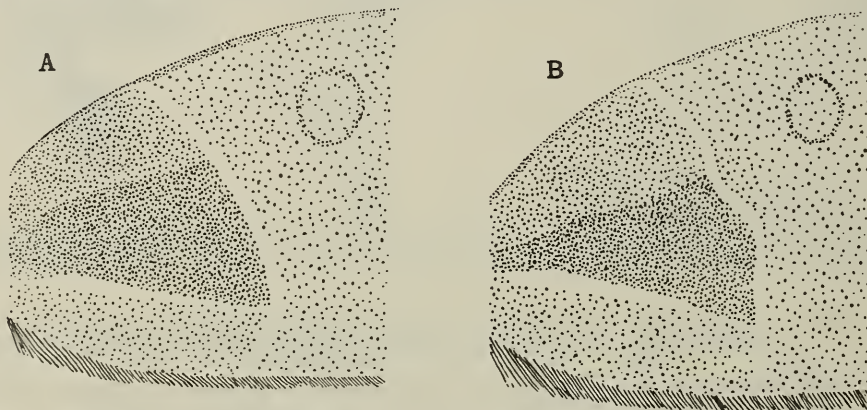
Distribution: Diparopsis castanea has been recorded in Mozambique, Union of South Africa, Transvaal, Natal, Nyasaland, Swaziland, Belgian Congo, West Africa, Northern and Southern Rhodesia, Uganda and Southern Tanganyika.

Hosts: Cultivated and wild cotton, Thespesia sp., abutilon, Cienfugosia hildebrandtii and Gossypioides kirkii.

Life History and Habits: Adults are nocturnal. They lay eggs on all parts of the host plant. Eggs hatch in 3-4 days and the young larvae migrate to squares or young bolls. In absence of fruiting bodies, larvae may bore into the stem, but this is unusual. There are 5 larval instars, the first two are usually on squares, flowers or very young bolls, later ones on more mature bolls. A larva may destroy upwards of 6 squares or one medium-sized boll. Normally larval development is complete in about 14 days, but in cooler weather this may be

doubled. Pupation occurs in the soil, the duration being extremely variable. In some instances, pupal development starts immediately and the moth emerges in 2-3 weeks, while in other instances the pupa may remain in diapause up to 32 months. There are 4 to 5 generations annually in South Africa with some larvae being found throughout the year. Oviposition usually reaches peak between late March and early May. Attacks are most noticeable during this period. In years with short seasons, damaging populations may be reduced as much as 70 percent.

Description: The head and thorax of male purplish-pink mixed with whitish and some fuscous; antennae ochreous-white, pectus ochreous-white, purplish in front; abdomen ochreous-white. Forewing purplish-pink mixed with whitish, costa irrorated with olive scales; antemedial line whitish, oblique from costa to submedian fold, with slight indentation (see figures to distinguish *D. castanea* from *D. watersi*) above fold, then erect, a dark brown band before it from costa to median nervure and crossed by a wedge-shaped olive patch in submedian interspace; an indistinct fine brownish medial line, oblique from costa to upper angle of cell, then inwardly oblique; a whitish postmedial line, excurved from costa to vein 4, then oblique, a similar subterminal line less incurved to costa, with blackish suffusion between them from vein 3 to inner margin; cilia pale olive mixed with fuscous. Forewing of female pinker and less purple, costal area not irrorated with olive, no band before costal half of antemedial line and patch below the cell paler, the area between postmedial and subterminal lines on inner area and the cilia pale olive. Wing expanse 27-31 mm. Young larva grayish-white, turning pale-pinkish to reddish after first molt. When nearly full-grown, a fairly uniform red color develops on a greenish background, head and thoracic plates chestnut; setae, setiferous tubercles and spiracles black. Anal plate grayish-white with black longitudinal line. Mature larva about 25 mm. in length. Pupa uniform light chestnut, tinted slightly greenish. A dark-green line runs dorsally to tip of abdomen. Length 14-17 mm. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 8(43)10-24-58



Forewings of (A) *D. watersi* and (B) *D. castanea*



Male of *Diparopsis* sp. (Slightly Reduced)

Figures (except map): Adult from Hampson, G. F. 1908. Catalogue of the Noctuidae in the Collection of the British Museum. 709 pp., London. Forewings from Clements, A. N. 1951. Bul. Ent. Res. 42(3):491-497.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

SOUTH AMERICAN BOLLWORM* (Sacadodes pyralis Dyar)

Economic Importance: This noctuid is considered to be one of the most important pests of cotton in South America. In Colombia it is considered the most injurious pest of cotton, with losses averaging about 20 percent annually. Sometimes whole crops are destroyed. Sacadodes pyralis caused serious damage to the cotton crop in Venezuela in 1952, and was reported as increasing in abundance in Nicaragua in 1953. As many as 500 eggs per 100 bolls have been recorded on late cotton in Venezuela, and as high as 60 to 70 percent of the bolls have been infested on isolated perennial plants in Trinidad. Perennial cotton is most severely infested, with the greatest damage coming during the dry season when the bolls are maturing. Larvae attack both squares and bolls, but bolls are most frequently attacked, the seeds being destroyed and the lint ruined. In Nicaragua it is required that all cotton plants be destroyed two weeks after harvest.



Bolls Showing Entrance and Exit Holes; Egg Enlarged 20 Times



General Distribution of South American Bollworm

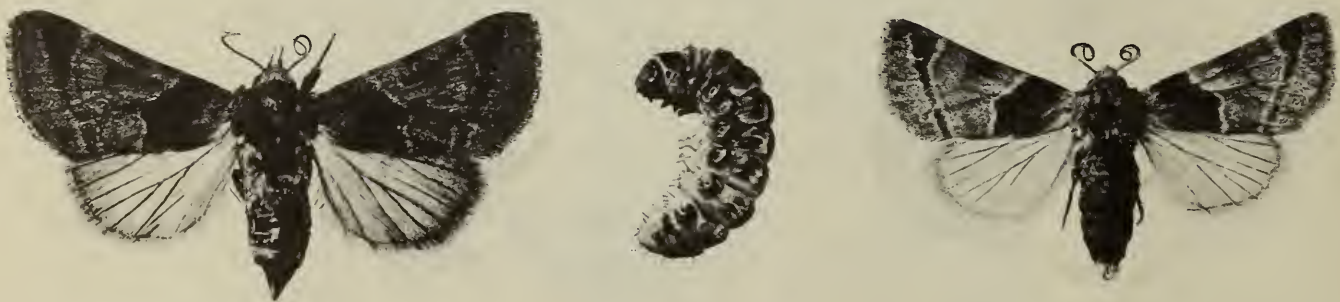
*Also called Trinidad bollworm. (Noctuidae, Lepidoptera)

Distribution: Occurs in Trinidad, Colombia, Venezuela, British Guiana, Nicaragua, El Salvador and Panama. There are specimens from Paraguay in the U. S. National Museum and it was recorded in the literature from Argentina by Dyar in 1912.

Hosts: Attacks cultivated and wild cotton principally, though it has been recorded attacking several other hosts. Okra and roselle (Hibiscus sabdariffa) are recorded in Trinidad, and Cienfugosia affinis in Venezuela.

Life History and Habits: Females lay around 128 eggs during a 3 to 8 day period. The eggs are laid singly on leaves, bolls and stems. Larvae hatch in 4 to 6 days, migrate to a boll, enter and begin feeding. Larvae feeding on mature bolls complete their development there, but those hatching on leaves or stems may feed on several bolls or squares. Whether squares or bolls are attacked, the larva enters the basal portion and bores into the interior. Larvae mature in 13 to 18 days and migrate to the surface of the soil where pupation begins. Sometimes, however, pupation may take place in webs at the base of the bolls. Adults emerge in 20 to 25 days, unless diapause occurs. This may prolong emergence several months. Three generations develop annually in some areas of Venezuela. Larvae begin to appear towards the end of October in Trinidad, especially in dry weather, and increase until the end of March or April when they may be so abundant that two larvae sometime occur inside one boll. Probably due to a scarcity of bolls larvae are seldom found during the wet season in Trinidad.

Description: Adult female wing expanse is 30 mm. Forewing clayey to purplish brown, basal and subterminal spaces darker, olivaceous brown; a narrow dark discal mark; lines lighter, antemedial line usually angled below cell; post-medial line curved outwardly from costa to vein M_3 , then straight but oblique to inner margin; subterminal line slightly oblique, nearly straight (usually slightly curved or weakly sigmoid). Hindwing of male whitish or ochraceous; ochraceous, fusco-ferruginous or fuscous in the female, usually with a pair of vague parallel transverse fuscous lines in the distal half of the wing. Hindwing with vein 5 strong, from well below middle of discocellulars; retinaculum of male, broad, not bar-shaped. Males are usually pale ochreous or greenish-ochreous. The egg is almost spherical, 0.7 mm. in diameter, sky-blue when first laid. Shell with fine network sculpturing and bristled closely with small spines that are somewhat hooked. Mature larva 25 to 30 mm. long; head and dorsum of prothorax brown or yellowish-brown; ground color of body creamy-white, back with suffusion of crimson. Body with primary setae present and setae of moderate size; intersegmental incisures very distinct. Pupa 13 to 15 mm., color brown or yellow-brown; resembles many other noctuids. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 8(17)4-25-58



Adults and Larva of Sacadodes pyralis

Figures (except map) from Withycombe, C. L. 1927. Bul. Ent. Res. 17(3):265-272.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

PHILIPPINE COTTON BOLL WEEVIL (Amorphaidea lata Motschulsky)

Economic Importance: Though cotton is of little economic importance in the Philippines, at the present time, this weevil is considered to be its most important pest and is prevalent wherever the crop is grown. The greatest injury is caused by the larvae; a large percentage of infested bolls drop. Adults in some instances may destroy flowers and very young bolls. Because of the exceedingly short life-history of the species, larval introduction through seeds into the United States is not expected, but the adults could be contained in plants, soil, seeds or raw cotton. Larval damage is similar to that caused by Anthonomus grandis except that the larvae of A. lata are almost always found in the ovary of the flower rather than in the square as is the case with A. grandis. Three additional species of Amorphaidea have been recorded as pests of cotton in Asiatic countries. They are A. arcuata in India, A. pectoralis in Java and A. rufa in Indochina.

Distribution: Philippine Islands (Manila, Laguna, Batangas, Mindoro, Ilocos Norte, Rombolon, Mindanao, Palawan and possibly other Provinces).

Hosts: All cultivated and wild varieties of cotton and Thespesia lampas.

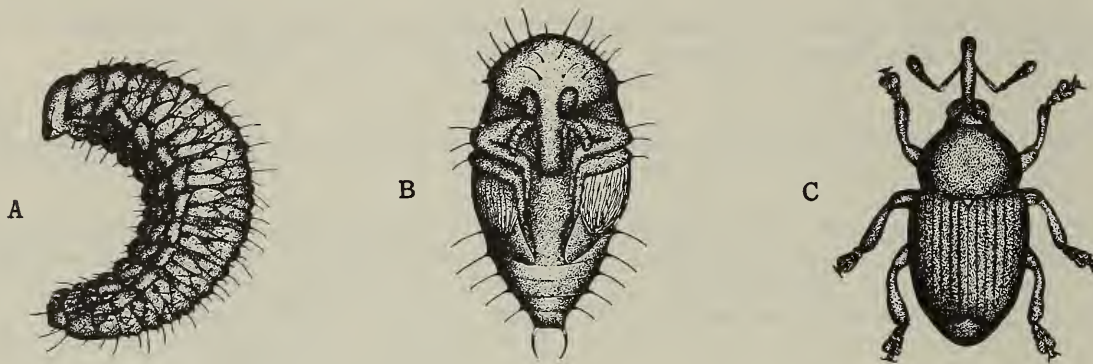
Life History and Habits: The adults become most noticeable during mid-morning, entering the flowers of host plants. Copulation takes place in the flowers and eggs are laid shortly thereafter, in cavities in the tissue of the base of the staminal sheath. Several eggs may be deposited in each flower. Eggs hatch in



Egg (greatly enlarged)
Located at Base of Staminal
Sheath of Cotton Flower

1 to 3 days and larvae begin feeding in the ovules and other soft parts of the square. As many as 9 larvae have been found in each boll after it has fallen to the ground. Larval development takes from 5 to 11 days, of which about half is spent as a resting stage in the soil. When larvae are in their feeding stage, they may completely destroy one or more of the ovules. In most cases the fruit drops to the ground before maturing. Sometimes undersized adults develop due to curtailed food supply, but normally larvae will die before maturity if the food supply is not adequate. Pupation takes place in the soil, about 10 to 20 mm. deep, and lasts from 3 to 5 days. The total life-cycle varies from 11 to 23 days, averaging 17 days. Adult hibernation occurs from June to October in the Philippines since no host plants are in bloom during that period.

Description: Adults are largely dark brown, 3-4 mm. long and about 1.2 mm. wide. Head minutely and shallowly pitted, sparsely pubescent; eyes lateral, convex and nearly circular. Rostrum about as long as prothorax, sides parallel. Antennae arising from middle of rostrum in female, beyond or in front of middle in male, elbowed, clavate; scape as long as succeeding joints, resting in groove at basal half of rostrum and reaching to eye. Prothorax $1\frac{1}{2}$ times as broad as long, sides rounded, broadest in middle, narrowed slightly behind and strongly constricted anteriorly, minutely pitted, and pale, with fine sparse golden pubescent below. Scutellum present. Elytra ovate, striated and finely pitted; pygidium exposed. Femora toothed. Eggs smooth, pearly white, elliptical to ovoid, about 0.6 mm. long and 0.4 mm. wide. Larvae wrinkled, grayish-white, crescent-shaped and legless with few scattered darker hairs. Pupae naked and resemble adults in general form; grayish-white with few scattered darker hairs. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies).
CEIR 8(48) 11-28-58



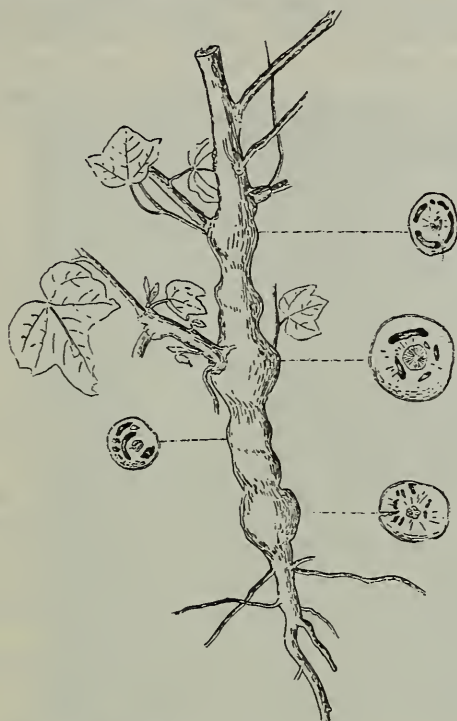
Figures of Amorphoidea lata (A) Larva (B) Pupa (C) Adult

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

COTTON STEM WEEVIL (Pempherulus affinis (Faust))

Economic Importance: The cotton stem weevil is considered a very important pest of cotton in India, Burma and Thailand, particularly on irrigated cotton.

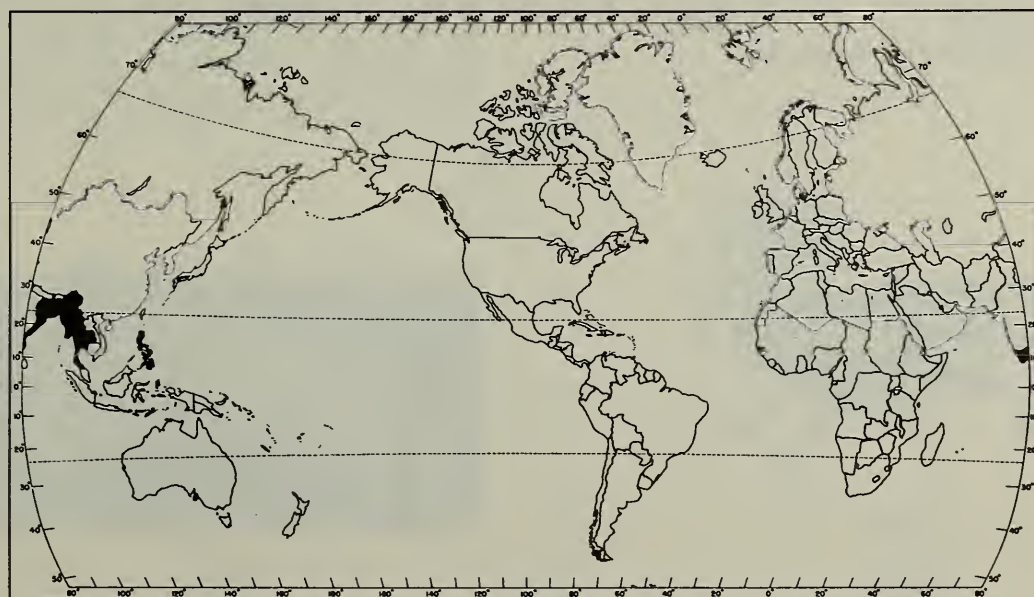
Damage to dryland cotton is usually light. In South India, where climatic conditions are most favorable, from 70 to 100 percent of the cotton in some fields may be attacked. For the 10-year period, 1928 to 1938, the pest was recorded as serious in India. Infested plants become stunted and sometimes succumb if injury is too severe. They easily break down in heavy wind. The major loss in India is to the seedlings, which almost always succumb to attack.



Hosts: Cotton is the major cultivated host, with okra and kenaf hibiscus being very important alternate food plants. In addition, 16 other alternate food plants have been recorded.

Distribution: This insect occurs throughout most of southern and western India, West Pakistan, Burma, Thailand and the Philippine Islands.

Damage to Cotton

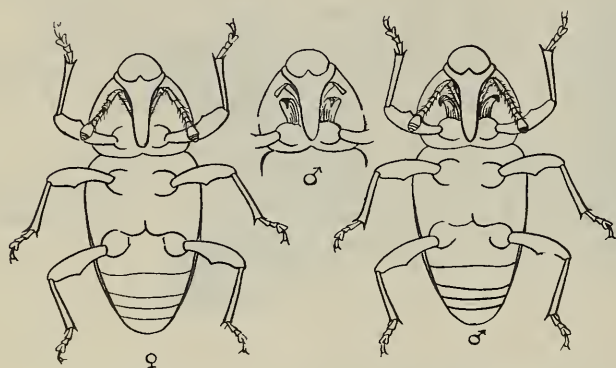


General Distribution of Cotton Stem Weevil

(Curculionidae:Zygopinae, Coleoptera)

Life History and Habits: Eggs are deposited in slits made by the female in the bark of the main stem, generally around the nodes. The female cements the egg in the cavity which produces a characteristic scar. Hatching occurs in about 10 days and the larvae begin feeding, making tunnels that are irregular, sometimes spiral, between the bark and the main stem. Each female produces about 46 eggs. Larval maturity takes place in 30 to 45 days, varying with humidity and temperature. The optimum humidity for young larvae is 100 percent. Eggs and young larvae are very sensitive to desiccation and require a high degree of moisture. The greatest mortality occurs in these stages. Pupation takes place in the burrow and lasts for about 12 days. The adults emerge from the stems of the host plants over a period of two months. Copulation begins almost immediately after emergence and may take place several times at frequent intervals for a period up to two months with little or no loss of fertility. Total development averages about 57 days. In southern India, as many as 6 generations a year may be produced.

Description: The adults are small; 3 mm. in length. Snout very prominent and comparatively long and pointed, curved down and backwards. Antennae attached to snout apart from proximal region, terminal segments enlarged and darker than others. Prothorax prominent, more or less cylindrical. Elytra rough, with longitudinal striations. Two sharp tubercles on ventral surface of body just in front of anterior coxae are usually present in the males of this species. Color is dark brown, speckled with minute grayish or whitish markings. At the central region of posterior margin of thorax is a small diamond-shaped white mark which continues backwards along inner edges of elytra. Sides of thorax and abdomen pale grayish-white. Upper portions of legs dark brown. Body of larva whitish-yellow, head brown; 5 mm. in length. Pupae uniform, pale white, with tinge of yellow; 4-4.5 mm. in length. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 8(33) 8-15-58



Female Male
(Ventral Aspects)



Adult



Larva

Figures (except map): Ventral aspect of male and female from Ballard, E. 1923. Dept. Agr. in India Mem. 7(12):243-255. Larva from Krishna Ayyar, P. N. and Margabandhu, V. 1941. Bul. Ent. Res. 32(1):61-82. Adult and damage from Madras Agr. Dept. Year Book 1918. 147 pp. Madras.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

LACKEY MOTH (Malacosoma neustria L.)

Economic Importance: Lackey moth is injurious to fruit and forest trees and woody ornamentals in many areas of Europe and in parts of China and Japan.



Together with brown-tail moth, it defoliated 10,000 acres of forest in Czechoslovakia in 1936. There are outbreaks at intervals in orchards in the British Isles which result in defoliation and subsequent loss of crops. The insect is chiefly an orchard pest in France but nurseries and trees are also attacked. Serious defoliation of fruit and broad-leaved trees occurs some years in parts of USSR, Bulgaria and Poland. In the Bari, Italy, area infestations are troublesome in almond plantings.

Distribution: Distribution includes Austria, Bulgaria, China, Czechoslovakia, Denmark, Finland, France, Germany, British Isles, Holland, Italy, Japan, Korea, Poland, Rumania, USSR (European part), Spain, Sweden, Switzerland, Turkey, Yugoslavia.

Hosts: Feeds on many deciduous fruit and forest trees including almond, apple, pear, plum, peach, cherry, oak, willow, elms, maple and beech. Roses, cotoneaster and other ornamentals are also attacked.

A Colony of Lackey Moth Larvae



General Distribution of Lackey Moth

Life History and Habits: Moths emerge in July and August. They are active at night. Eggs are deposited in bands around small branches or twigs, from 100-250 eggs per mass. Overwintering occurs in the egg stage. Larvae hatch in late April and May, spin webs and feed gregariously on nearby foliage. As development proceeds, they spin larger tents from which they migrate over the tree, feeding voraciously. Migration to nearby trees sometimes occurs. Pupation takes place in loose cocoons on branches, between leaves and in dry debris. In Italy, larval and pupal stages last 38-47 days and 12-22 days, respectively.

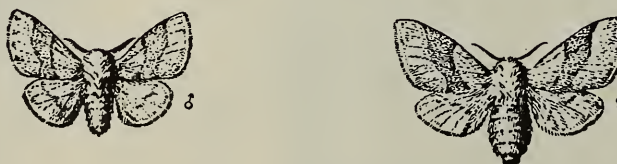
Description: Adult expanse - male 25 to 30 mm., female 35 to 40 mm. Body, antennae, legs and forewings generally yellow-ochre or reddish-brown. Forewing has large transverse dark colored band. Hindwing lighter colored with a transverse band also lighter than that of forewing. Cocoon yellowish, pupa brownish. Larva is brilliantly colored. Head grayish-blue, whitish medio-dorsal line, grayish-blue longitudinal bands on sides. The prothoracic and eighth abdominal segments have two small dark warts dorsally. Ventrally, the larva is bluish or dirty yellow. Hairs brown, more numerous on sides.
(Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.)
CEIR 8 (6) 2-7-58

Stages of Malacosoma neustria



Egg Band

Larva and Cocoon



Male and Female Moths

Figures (except map): Larvae and tent from Palmer, R. and Westell, W. P. 1922. Pests of Garden and Orchard, Farm and Forest. 413 pp. London. All stages from Lengerken, H. von. 1932. Das Schadlingsbuch. 194 pp. Berlin.

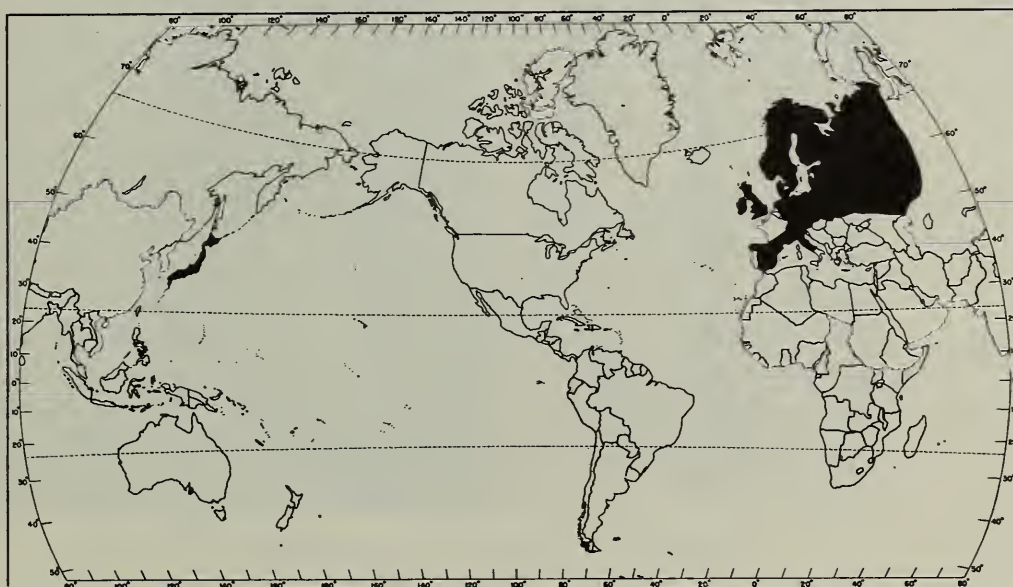
INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

PINE MOTH (*Panolis flammea* (Denis and Schiffermuller))

Economic Importance: Pine moth is one of the most destructive insects of coniferous forests in Europe. Two successive attacks will kill a pine forest. In 1924, about 425,000 acres of forest were defoliated in northwestern Poland and northeastern Germany. This necessitated the cutting of over 400 million board feet of pine and fir in that area. Severe outbreaks have been reported in other years in Germany and in the Kharkov area of USSR, Czechoslovakia and Finland.

Distribution: British Isles, most of continental Europe and Japan.

Hosts: Pine preferred. Also attacks silver fir, Douglas-fir, spruce, juniper, European larch and some broad-leaved trees.



General Distribution of *Panolis flammea*

Life History and Habits: The moth is not commonly observed, being a night-flying species. Emergence occurs in March or April. The eggs are deposited in batches of 4 to 8 on pine needles of the preceeding year. Trees with dense foliage are preferred. The larval period coincides with the opening of the buds and the young growth is quickly devoured in an infestation. At a slight disturbance the larva drops to the ground by means of a silken thread. Feeding continues up to the end of July at which time the full-grown larva drops to the ground where it pupates. The winter is passed in this stage. In heavy infestations the old foliage is consumed along with the new, thereby leading to tree mortality.

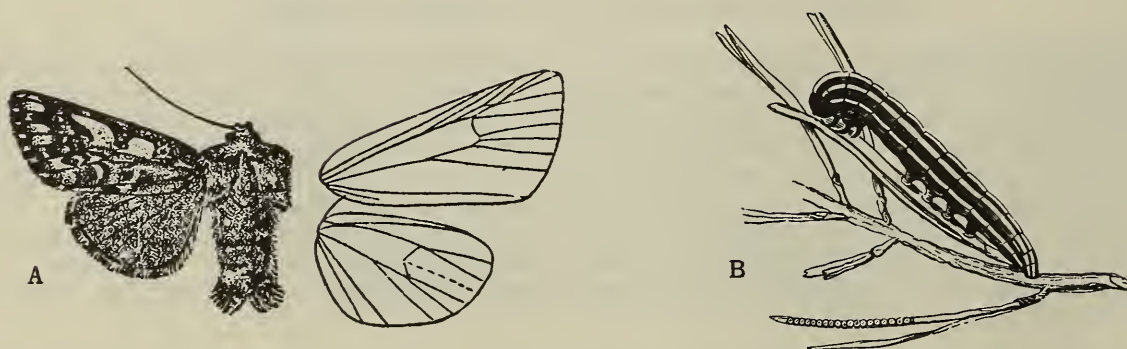
Description: Adult spread 30-40 mm. Head and thorax rufous mixed with white, tarsi ringed with white, abdomen generally brown. Forewing rufous suffused with gray and white (see illustration), veins white and brown. Hindwing fuscous brown, cilia white at tips; underside whitish suffused with rufous, a discoidal spot and curved postmedial line with a slight dark streak at the veins. Color of larva varies with stage. At first, head is brownish and body clear green.

(Noctuidae, Lepidoptera)

After each molt the larva becomes more deeply colored, deep green to pale brown with scattered black dots and white dorsal line. Subdorsal line also white, sometimes double, black-edged. Spiracular line white, edged below with orange or yellow. (Prepared in Plant Pest Survey in cooperation with other ARS agencies.) CEIR 8 (51) 12-19-58



Damage to Pine by P. flammea



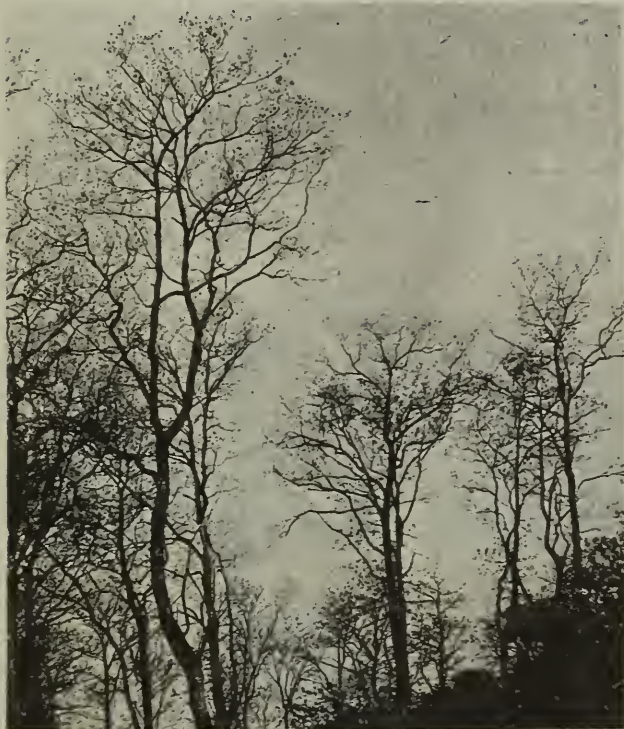
Adult Male (A), Larva and Eggs (B) of Panolis flammea.

Figures (except map): Larva and eggs from Koch, R. 1913. Tabellen zur Bestimmung Schädlicher Insekten an Kiefer und Larche. 207 pp. Berlin. Adult from Hampson, G. F. 1905. Catalogue of the Noctuidae in the Collection of the British Museum. Vol. 5, 634 pp. Damage from Sachtelben, H. 1929. Monograph. zum Pflanzenschutz 3, 160 pp. Berlin.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

GREEN OAK TORTRIX* (Tortrix viridana L.)

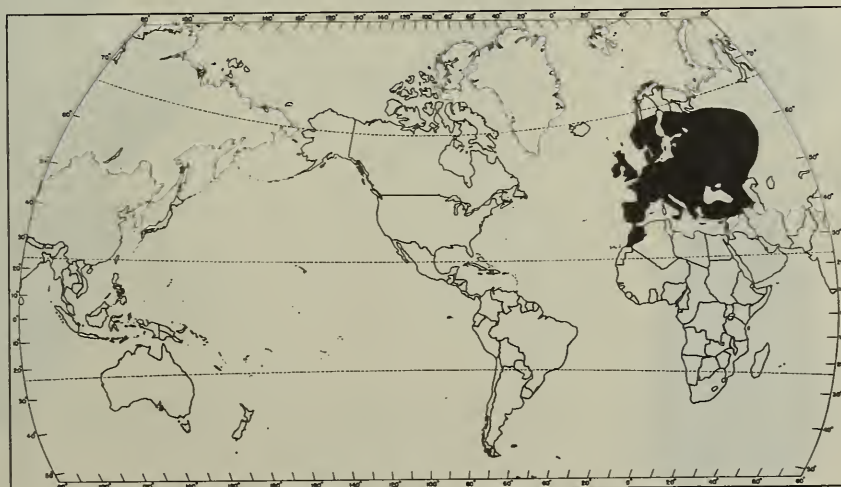
Economic Importance: This defoliator is a serious pest of oak forests in Europe, often requiring widespread control measures. It has been called the most injurious lepidopterous pest of oak in the United Kingdom and is possibly the worst forestry pest in southern Europe due to the importance of its attack on the cork oak forests and the hog-feed forests of the Iberian Peninsula. Complete defoliation may occur in severe outbreaks. Repeated defoliations cause die-back and weaken the trees, predisposing them to attacks by fungi and other destructive agents.



Defoliated Oaks with
Undamaged Beech Undergrowth

Distribution: Reported to occur throughout Europe. Also Turkey and Morocco.

Hosts: Principal host plants are species of oak. May also attack beech, linden, maple, and other trees.



General Distribution of Green Oak Tortrix

* Also called green oak roller moth and oak leaf roller (Tortricidae, Lepidoptera).

Life History and Habits: Under conditions in the British Isles, moths are in flight in June and July. Eggs are laid in pairs, or small groups, on buds and young twigs, and are very difficult to see being of general appearance of the bark surface. Overwintering occurs in egg stage with larvae appearing in May. The young caterpillars begin feeding on the foliage when it is still in the bud stage. The flowers are also attacked. The larvae skeletonize and spin the leaves together. At a later stage they roll the leaves in a characteristic manner, the upper side outwards. Pupation takes place in late May or June (usually June) within, or partially within, a folded leaf. This moth is usually a pest of older woods although it sometimes spreads to younger stands. Tops of trees are generally attacked first.

Description: Adult expanse about 18 mm. Forewings bright green, hindwings grayish; both pairs with slight fringe of whitish scales around margins. Larva about 12 mm., greenish-gray above, green below, with black tubercles and brownish-black head. Pupa black. Eggs very small, circular and flat. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 8(12) 3-21-58



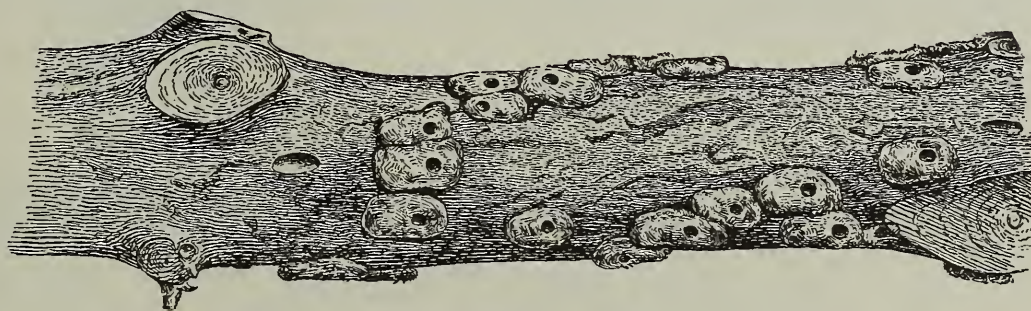
Larva and Adult of
Tortrix viridana

Characteristic Leaf Rolling

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

BANDED PINE WEEVIL (*Pissodes notatus* F.)

Economic Importance: *Pissodes notatus* and the closely related species *P. pini*, are among the most important forest insects in the British Isles. *P. notatus* is one of the chief pests of pines in parts of USSR where large portions of new plantations are often killed. Young pines are also severely damaged in Finland and Spain. The weevil first appeared in Uruguay about 1919 and by 1924 it had become a serious pest, destroying thousands of young pine trees. Banded pine weevil is injurious in both the larval and adult stages.



Characteristic Damage by *Pissodes notatus*



General Distribution of Banded Pine Weevil

(Curculionidae, Coleoptera)

Distribution: Most of Europe into eastern Siberia, also Algeria and Uruguay.

Hosts: Pine, spruce, larch, fir.

Life History and Habits: *Pissodes notatus* adults are long-lived, being found during all the warm months of the year. Life cycle from egg to egg usually requires about one year. Females oviposit in punctures in bark of young pines between the root collar and first whorl of branches and in older trees on trunk and branches. The larvae tunnel between bark and the wood, often producing radiating galleries. These galleries end in the pupal chamber which consists of a hollow, roofed with chips and fibers. Both larvae and adults cause damage. Larvae mine bark of stems and roots, adults feed on young shoots. Favorite breeding sites are in 2-10 year old pine plantations. Attack on pine is characterized by fine punctures on stem, swellings on bark from developing larvae and pupae and exit holes made by emerging adults.

Description: Adult 4-8 mm. in length, red-brown to dark brown. Elytra have two distinct bands of scales. Bands yellowish and white, anterior not meeting in middle, posterior broadened in center. Striae small, not distinct. Antennae inserted at middle of snout, femora not toothed. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 8(14) 4-4-58



Pissodes notatus Adult

Figures (except map): Adult from Koch, R. 1913. Tabellen zur Bestimmung Schädlicher Insekten an Kiefer und Larche. 207 pp. Berlin. Damage from Boas, J. E. V. 1924. Dansk Forstzoologi. 761 pp. Copenhagen.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

VIOLET LEAF MIDGE* (*Dasyneura affinis* (Kieffer))

Economic Importance: This pest causes serious damage to cultivated and wild violets in areas of Europe and Africa. Infestations have increased in Germany since 1950. They have reached about 30 percent in plantings near Berlin, where they may cause loss of flower production. Heavy infestations cause distortion and dwarfing and sometimes death of the plant. Living pupae were found in the leaves of a violet plant in the mails from England at Hoboken, New Jersey, in 1954.



Damage to Violet

Distribution: Widely distributed throughout Europe, being recorded in Sweden, Denmark, Hungary, Italy, Rumania, France, Portugal, Great Britain and Germany. Also known to occur in Algeria, Morocco and Egypt in North Africa.

Hosts: Cultivated and wild *Viola*, including violets and pansies.

Life History and Habits: Females begin emerging from overwintering cocoons in the spring. They live from 3 days to one week and lay up to 98 eggs each. Eggs are laid in the leaf tissue along the margins of the older outer leaves or within the rolled edges of the younger leaves. Eggs laid in exposed dry positions die. Larvae hatch in 6 to 8 days at 68° F. and cause formation of hairy galls on the shoots and leaves. They feed gregariously inside the leaf, as many as 24 larvae being found in a single gall. There are generally 4 larval molts in France. The usual larval period lasts about 6 weeks except in the overwintering generation. The total larval period varies from a minimum of 27 days in the spring and summer to a maximum of about 7 months in the overwintering generation. The mature larva spins a cocoon within the gall, although it may spin a cocoon elsewhere if

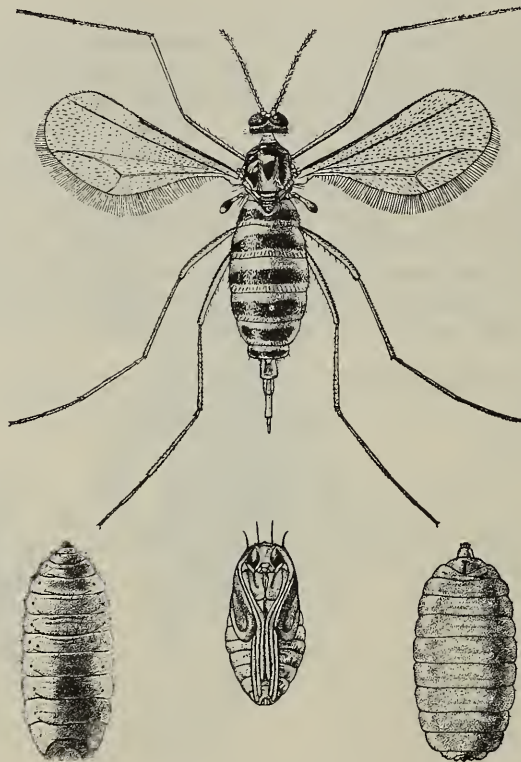


General Distribution of Violet Leaf Midge

Also called Violet Leaf Rolling
Gall Midge (Itonididae, Diptera).

necessary. Pupation takes place in the cocoons and lasts about 10-12 days. There are four generations a year in cooler climates and five in warmer climates. Temperatures of 68 to 86 degrees and a relative humidity of 80 to 95 percent are most favorable for development in Germany. Larval feeding causes the margins of leaves to curl upward, discolor and become malformed. Galls are recognizable about 8 to 11 days after the eggs are laid. Infested violets may be found year-round in Egypt.

Description: Adult small, yellowish with blackish markings on head and thorax. Antennae long, 15-segmented; two basal segments short and broad, following ones narrow, cylindrical in female, pyriform and ended by long neck in male; surface appears pubescent. Maxillary palpi 4-segmented. Wings smoky, with squamulae, mainly at anterior edge. Subcostal vein rather short. Legs long and thin; first tarsal segment very short, last provided with two bifid claws and thick empodium. Egg yellowish-white, cylindrical, both extremities rounded, about 0.25 mm. long and 0.5 mm wide. Larva 14-segmented. Color variable; hyaline whitish, pale yellowish and pale pinkish according to instars. Mature larva about 2 mm. Dorsally, head cone-shaped and with antennae; base swollen. Antenna with small basal swelling, tiny terminal papilla. Ventrally, the third segment with bifurcated sternal spatula, Y-shaped and situated mid-ventrally on thorax. Pupa with cephalic teeth used in opening cocoon or gall. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies and the U. S. N. M.) CEIR 8 (47) 11-21-58



Larva, Pupa and Adult

Figures (except map): Damage from Barnes, H. F. 1948. Gall Midges of Economic Importance. Vol. IV. Gall Midges of Ornamental Plants and Shrubs. 165 pp. London. Larva, pupa and adult from Zoheiry, M. S. El- 1944. Societe Fouad 1^{er} D'Entomologie Bul. 28:113-118.

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FOREIGN PEST RELEASES INCLUDED IN CEIR, VOL. 7, 1957

APPLE SUCKER (Psylla mali Schmidberger)
ASIATIC RICE BORER (Chilo suppressalis (Walker))
BALUCHISTAN MELON FLY (Myiopardalis pardalina (Bigot))
BEAN FLY (Melanagromyza phaseoli (Coquillett))
BEE MITE (Acarapis woodi Rennie)
BEET BUG (Piesma quadratum (Fieber))
BEET SAWFLY or TURNIP SAWFLY (Athalia colibri (Christ))
BEET WEEVIL (Cleonus punctiventris Germ.)
BUFFALO FLY (Siphona exigua (De Meijere))
CHAFER (Melolontha melolontha (L.))
COTTON JASSID (Empoasca lybica (Bergevin))
COTTON PLANT BUG (Horcias nobilellus (Berg))
CUCURBIT BEETLE (Diabrotica speciosa Germ.)
DESERT LOCUST (Schistocerca gregaria (Forsk.)
DURRA STALK BORER (Sesamia cretica Led.)
EGYPTIAN COTTONWORM, TOMATO CATERPILLAR or
TOBACCO CATERPILLAR (Prodenia litura F.)
GARDEN CHAFER (Phyllopertha horticola (L.))
HUMAN BOT FLY (Dermatobia hominis (L., Jr.))
LEAF-CUTTING ANT (Atta sexdens (L.))
LIGHT-BROWN APPLE MOTH (Austrotortrix postvittana (Wlk.))
MAIZE STALK BORER (Busseola fusca Fuller)
NUN MOTH (Lymantria monacha L.)
ORIENTAL BLACK CITRUS APHID (Aphis citricidus (Kirkaldy))
PADDY BORER or RICE STEM BORER (Schoenobius incertulas (Walk.))
PINE LAPPET (Dendrolimus pini L.)
QUEENSLAND FRUIT FLY (Dacus tryoni (Frogg.))
RUTHERGLEN BUG (Nysius vinitor Bergroth)
SENN PEST (Eurygaster integriceps Puton)
SPINY BOLLWORM (Earias insulana (Bdv.))
TOBACCO STEM BORER (Gnorimoschema heliopa (Lower))
TURNIP GALL WEEVIL (Ceutorhynchus pleurostigma (Marsham))
TURNIP MOTH (Agrotis segetum (Denis and Schiffermuller))
VINE MOTH (Lobesia botrana (Schiff.))
WHEAT BULB FLY (Hylemya coarctata Fallen)
WINTER MOTH (Operophtera brumata (L.))
YELLOW PEACH MOTH (Dichocrocis punctiferalis Guen.)

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